CHAPTER 16

MISCELLANEOUS

INTRODUCTION

This chapter contains guidelines and criteria for the design of roadway elements that do not logically fit within the general categories of information covered in other Road Design Manual chapters.

FENCE

When new fencing is required, it normally is included in the contract plans and constructed by the contractor. This section discusses established Department practice with regard to fencing and the various types of fencing that are used.

The Department of Transportation will acquire possession of all fence within the right-of-way and easement areas unless otherwise noted in the plans and will require the contractors to remove but not salvage the fence. The landowner will be permitted to salvage whatever portion of the fence they may desire so long as they salvage it before the contractor removes the fence. The landowner must be informed that any fence they want to salvage must be taken before the contractor is ready to remove the fence. The DOT cannot promise that the contractor will make any delays to permit this salvage.

Interstate Projects

On Interstate projects the Department will provide a fence along the entire length of the right-of-way. The fence will be located inside the right-of-way line, will remain as property of the State, and will be maintained by the Department. For Interstate projects match the existing fence in rural sections and consider chain link fence in urban sections.

Highway Projects

On highway projects, except Interstate projects, the Department will generally provide a fence only in those areas where a fence exists. The fence being provided will be a standard type that conforms as nearly as possible to the existing fence. 4 strand barbed wires is the typical minimum number of strands used. The standard right-of-way fence consists of alternating wood and steel posts. When landowners request a change in the fence type to be constructed on their property, such as all steel or all wood posts or smooth wire in lieu of the barbed wire, the design modification will be shown by a note on the plans for all areas this change affects. This change in fence design will be made as a right-of-way consideration on an individual basis. The change will be shown in the right-of-way agreement. The fence will be located on or outside the right-of-way line and will become the property of the landowner. The landowner is responsible for maintaining the fence.

Temporary Fence

A temporary fence will be provided where necessary to contain livestock before the contractor clears the existing fence or when the landowner salvages the fence. Temporary fence is the property of the landowner for all types of temporary fence except for Type 1. The contractor will remove all Type 1 temporary fence after the permanent fence has been placed. The Department will not be responsible for containment of livestock between the time when the landowner salvages the fence and when the contractor can place the temporary fence. No temporary fence will be provided if the landowner elects to permanently remove a fence.

Temporary Easement Area Fence

The Department may also place temporary Type 1A, 2, or 3 fence around cut slope or fill slope easement areas of applicable size that are on highly erodible pasture land, and around permanent erosion protection and disturbed areas that have been reseeded around culvert ends. The grantor, through the ROW agreement, will allow such fence to remain in place and will maintain the fence for a period of 3 years after the area is seeded. The purpose of the fence is to allow vegetation to become well established and avoid overgrazing and erosion problems. After the 3-year period the fence becomes the property of the landowner and can be removed. The fence could be removed before the 3-year period has ended if the Region Engineer agrees that the vegetation is established well enough.

Post Panels

Post panels will be placed in the fence where they are required as detailed on the Standard Plates.

Gates

Wire gates will be provided at farm and field entrances. Tubular gates will only be used to replace existing tubular gates or as an item of a Right-of-Way settlement.

Chain Link Fence

Chain link fence will be placed on construction projects only in special cases. Some cases involve places where chain link fence already exists, in urban areas where access is prohibited, and on bridges where sidewalks are provided for pedestrians.

Tension wire instead of top rail is to be used on chain link fence that will be placed in the State Right of Way. It will be the landowners choice on what is used when placed on private property.

Types of Fence

The several types of fence used by the Department are detailed in Standard Plate Series 620 and 621 (Temporary Fences are not shown on standard plates). The fence types are:

- Right-of-Way Fence

  Type 1: 3 barbed wires (can be considered when requested by landowner)

  Type 2: 4 barbed wires

  Type 3: 5 barbed wires

  Type 4: 26 in. woven wire with 2 barbed wires

  Type 5: 26 in. woven wire with 4 barbed wires

  Type 6: 32 in. woven wire with 3 barbed wires

- Temporary Fence

  Type 1: Erected in a manner to ensure livestock will be confined. Contractor retains ownership.

  Type 1A: Erected in a manner to ensure livestock will be confined. Fence remains in place and the landowner retains ownership.

  Type 2: 4 barbed wires fastened to steel posts spaced 20 ft center to center. Fence remains in place and the landowner retains ownership.

  Type 3: 26 in. woven wire with 2 barbed wires fastened to steel posts spaced 20 ft center to center. Fence remains in place and the landowner retains ownership.

- Chain Link Fence

  Residential 48 in. height of fabric

  Commercial 72 in. height of fabric

  Interstate 72 in. height of fabric

1. Special Right-of-Way Fence (Buffalo Fence)

   Custer State Park, Windcave National Park and ranchers all have their own standard buffalo fence. The following can be used as a guide when working with landowners:

   Known specifications are 66 in. to top wire and 5 in. diameter line post 9 ft long.

2. Type 1: 6 strand 12 ½ ga. Barbed Wire with 4 point barbs, 18 ft post spacing with droppers spaced 6 ft between post
3. Type 2: 60 in. woven wire, 15 ft post spacing
4. Type 3: 32 in. woven wire with 2 - 12 ½ ga. Barbed Wire with 4 point barbs top and 1 – 12 ½ ga. High Tension Smooth Wire bottom, 18 ft post spacing

Estimating Fence Quantities

The following criteria should apply for estimating quantities.

- Right-of-Way Fence

  Right-of-Way Fence will be estimated by scaled horizontal length measured to the nearest ft including the lengths of brace panels and gates.

- Temporary Fence

  Temporary Fence will be estimated by horizontal length measured to the nearest ft including the lengths of brace panels and gates.

- Chain Link Fence

  Chain Link Fence will be estimated by horizontal length measured to the nearest ft including the end panels, corner panels, and pull posts.

CATTLE GUARDS

Cattle guards are devices used to allow vehicular traffic to enter or exit the landowner's property while keeping cattle within the boundaries of the landowner's property. Cattle guards may or may not have wings on which to attach the adjacent fence. Cattle guards are installed on a project when one of the following occurs:

- An existing cattle guard is being impacted in some manner.
- It is a result of Right-of-Way negotiations.
- The landowner pays the total cost of the new cattle guard.

Because cattle guards are considered private property, they are to be placed entirely on the landowner's property. The center of the cattle guard should be placed 5.5 ft back from the ROW line. The ROW fence will be tapered a distance of either 150 ft if no fence panel is to be used or 30 ft if a 3 post panel is used coming into and leaving the cattle guard.

CATTLE PASSES

Cattle passes are structures that allow cattle to move from one side of the roadway to the other side. Cattle passes are only placed on projects where cattle passes presently exist or where placement is a condition of the right-of-way (ROW) agreement.

Several methods may be used to create a cattle pass such as a reinforced concrete box culvert (RCBC) used solely for cattle passage, a dual use RCBC for drainage and cattle passage or a cattle path adjacent to a drainage channel underneath a bridge.

The most common type of cattle pass is a RCBC placed specifically for the passage of cattle. The most common size is a 5 ft x 7 ft cattle pass. The size is dependent on the length of the cattle pass to be installed. Studies have shown that if the far opening of the box culvert does not appear large enough, the cattle will not enter the cattle pass. For maximum usefulness and minimum cattle driving required, the length of a cattle pass shall generally be less than 2.5 to 3 times its clear end opening area.

Using cattle passes as drainage structures should be avoided, if possible, depending upon the surrounding terrain and the size of the drainage basin.

Following are some general descriptions of design options for cattle passes with smaller drainage basins where a reinforced concrete pipe would typically be used to handle the drainage if no cattle pass was necessary:

1. The first option should be to provide a separate drainage structure at a flowline lower than the adjacent cattle pass. If there is sufficient cover available, the drainage structure should be placed as low as necessary to pass the design flow without forcing any water through the cattle pass.

2. Commonly, there is limited cover at a cattle pass site. The second option would be to provide a separate drainage structure, but with the flow line set only slightly lower (1 ft or 2 ft, for example) than the adjacent cattle pass. This would allow low flows to be handled by the drainage structure, but higher flows would by-pass into the cattle pass.

3. If cover is limited such that the flow lines of the drainage structure and cattle pass must be at or near the same elevation, the third option would be to consider separation of the two structures. The drainage structure would be retained at the low point drainage crossing with the cattle pass shifted back or ahead a sufficient distance to allow for a ditch block (berm) between the structures to direct the flow to the drainage structure. Typically, the cattle pass would only handle the flow from the minimal local area around the cattle pass. As in option # 2, the ditch block elevation could be set lower to allow higher flows to by-pass through the cattle pass.

4. If none of the first three options are feasible, the fourth option would be to determine if there is any other nearby location that is acceptable to the landowner and that would allow one of the first three options to be used.

5. If all other options are determined to not be feasible, the designer should provide a dual use cattle pass structure to handle both cattle passage as well as drainage flow. If riprap is necessary at a particular site, grouted riprap should be reviewed as a possible design feature for each end of the pass.

Each site is unique and must be reviewed. For example, if a particular site would require a 60 in. RC pipe to accommodate the design flow adjacent to the cattle pass, a cost estimate should be done to determine the cost associated with providing separate structures. For comparison, the cost of a 60 in. RC pipe installation per ft is approximately four times as much as a 24 in. RC pipe. Due to the high cost of a 60 in. RC pipe, this might be a situation where a smaller sized pipe would be installed instead and the drainage would be allowed to by-pass into the cattle pass more frequently (a lower design year frequency) as described in Option # 2 above.

For large drainage basins, RCBC’s can be modified to allow a walkway for the cattle at a level above the flowline of the culvert.

If a bridge is in the vicinity of the required pass, the channel may be modified to provide a path that the cattle may use that is not in the normal water flow. The Hydraulics office should be contacted to determine if such a pass is possible.

Size / Length Recommendations

Table 16-1 below provides standardized cattle pass size recommendations based on length of need guidelines from the March 1978 “Livestock Underpass Usage Study”.

Table 16-1 Cattle Pass Size / Length Recommendations

Size	End Area (sq. ft.)	Max. Barrel Length From Study (ft.)	Proposed Max. Barrel Length (ft.)
5' x 7'	35	80 to 107	100
7' x 7'	49	122 to 163	140
9' x 8'	72	180 to 240	210
10' x 8'	80	200 to 267	240

It is recommended that the proposed maximum values be used for new construction. These measurements would be measured from the top of the structure opening. If an extension of an existing structure was considered, it is allowable to go to the larger number barrel length from the ranges taken from the Study shown in Table 16-1. The numbers shown in the ranges are based upon a recommendation of an A/L ratio from 0.30 to 0.40. (A/L – Area/Length ratio)

The landowner would be responsible for the increased cost if requesting a larger structure above the recommended opening on structures being replaced.* If the department was proposing to extend an existing structure and the owner requested a larger structure, the landowner would be expected to pay the difference between the larger structure and the cost of just the extension.

* The owner should contribute towards the cost. However, based upon ROW negotiations, it may or may not be the entire difference. What can be justified through negotiations should be the determining amount and typically varies from situation to situation.

For resurfacing projects a precast 4 ft x 6 ft cattle pass may be extended to a proposed maximum barrel length of 64 ft. The maximum barrel length from the study is 55 ft to 73 ft.

Slope Recommendations

If possible, cattle passes should be placed on a slope up to 1%. Some slope is beneficial for cattle passes because it allows for drainage and helps prevent silt buildup. If conditions warrant a steeper slope, the maximum slope may not exceed 6%.

ENCASEMENT PIPE FOR UTILITY

Through coordination with utility companies, ROW negotiations or landowner meetings the need for encasement pipe for existing and future utilities may be requested. If encasement pipe is requested, it should be determined what type shall be used and the location. PVC is typically used but other type of pipe materials may be used. If PVC is requested, the pipe should be approximately 2 in. to 4 in. larger in diameter than the utility it is going to carry. Typically a schedule 80 PVC is used. The schedule of the PVC needs to be clarified in a note in the plans if PVC encasement pipe is used. Type of pipe material also aids in determining the location of the encasement pipe for future use. If PVC encasement pipe is used, a flexible object marker without reflective tape shall be used to mark the ends of the PVC encasement pipe.

The encasement pipe lateral placement limits are at the catch point (toe) of a fill slope or at the bottom of the ditch section (see Figure 16-1). The encasement pipe is typically placed 6 ft below the flowline of the ditch or 6 ft below the ground at the toe of the fill.

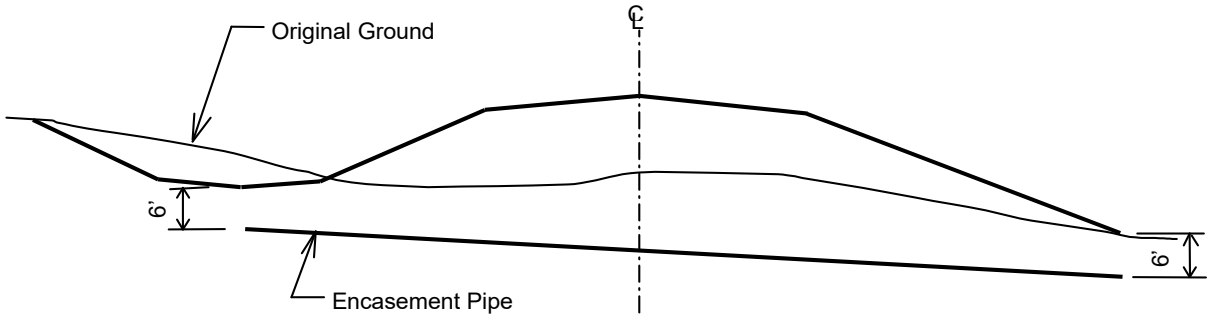


Figure 16-1 Placement of Encasement Pipe for Utility

JOINT UTILITY TRENCH

A joint utility trench should be considered where several utilities will be in the same vicinity on a project. Work with the Transportation Utility Coordinator to coordinate with the Utility Companies as to what details will be needed in the plans. An example of a Joint Trench Layout is shown in Chapter 18 – Plans Assembly.

ADA GUIDELINES

Where guidelines are noted below in the sections for Sidewalks, Ramps, Curb Ramps, Pedestrian Push Buttons at Curb Ramps, Crosswalks, and Parking, the following reference materials were used:

[1] *US DOJ 2010 ADA Standards for Accessible Design,* September 15, 2010 http://www.ada.gov/2010ADAstandards_index.htm

[2] *Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way*, July 26, 2011 http://www.access-board.gov/guidelines-and-standards/streets-sidewalks/public-rights-of-way

[3] *Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way; Shared Use Paths Published in the Federal Register,* February 13, 2013 https://www.access-board.gov/guidelines-and-standards/streets-sidewalks/shared-use-paths/supplemental-notice

[4] *2015 edition of the International Building Code as published by the International Code Council, Incorporated.*

Scope and Survey Needs

During the scope process for all projects, the type and amount of survey shall be noted. In most cases the designer may need to perform a field inspection to determine what locations need a detailed survey so that the designer can check if the current location meets ADA guidelines and/or use the survey data to determine impacts to ROW, utilities, etc. during design.

Therefore, surveys for resurfacing and stand-alone lighting, signal, or signing projects need to be obtained so the design process may begin a minimum of 2 years prior to the proposed letting date of the project. In some cases a more detailed survey will be needed for those types of projects. Surveys for reconstruction projects should not change.

Requirements for surveys are located in Section F) Collecting Digital Terrain Model (dtm) Data and Section G) Topography and Field Notes of Chapter 6 of the SDDOT Survey Manual located at https://dot.sd.gov/doing-business/engineering/design-services/surveyors. When ground shots and topography features are taken, the survey should include adequate coverage to detail the sidewalk and ramp widths, cross slopes, longitudinal grades, landing size, vertical grade breaks, building entrances, steps, ramps and all ADA related items located within/near the pedestrian access route along the highway ROW.

ROW and Utility Impacts

In certain situations applying ADA guidelines will impact ROW and Utilities. This will increase the length of time to design a project which includes appraising/negotiating necessary ROW and coordination of utility relocations. Options to help reduce these efforts should be considered. Some options are as follows:

- Obtain strips of easements (i.e. 5 ft behind ROW) and/or permanent ROW for utilities. These easements may be obtained in the name of the State, City or Utility Company.
- Obtain permanent ROW block-outs for signal poles and permanent easement for light poles to gain rights for footing and pole locations.
- Request City agencies to work with adjacent landowners with regard to ROW needs to be dedicated from property owner for utilities.

Note – Where a detailed project schedule has not been established, coordination between the designer and the ROW and/or Utilities Office shall be made.

Construction/Reconstruction Guidelines

Although PROWAG has not been formally adopted, construction/reconstruction projects should be designed to follow these guidelines where practical. The designer shall provide documentation on what guidelines are not met and justification for their decisions.

Resurfacing Guidelines

Where practical, an effort to utilize the construction/reconstruction guidelines established from PROWAG should be made for resurfacing projects. This does not include Surface Treatment projects. However, if PROWAG can not be followed due to design issues, ADAAG may be utilized. The designer shall provide documentation on what guidelines are not met and justification for their decisions. Coordination between the Department and the local governing agency should be done in order to determine the community's needs at the present time and the foreseeable future.

An exception to the use of ADAAG for resurfacing projects is for crosswalks. Crosswalk design should always be based upon the guidelines contained in PROWAG.

Roadway Safety Improvement (RSI) Guidelines

Everything within the limits of the RSI project must meet ADA guidelines under the construction/reconstruction guidelines or resurfacing guidelines as determined by impacts (ROW, Utility, etc) and cost. The designer shall provide documentation on what guidelines are not met and justification for their decisions.

Lighting, Signal, and Signing Guidelines

Where practical, an effort to utilize ‘clear width’ guidelines established in PROWAG should be made for stand-alone lighting, signal or signing projects. Where not practical, ADAAG ‘clear width’ guidelines shall be used. All other guidelines need only be met to the extent defined in the project’s scoping document. The designer shall provide documentation on what guidelines are not met and justification for their decisions. An explanation of “clear width” is provided later in this chapter.

Documentation

Under special conditions (ROW constraints, existing buildings, etc.) it may be impractical to apply all ADA guidelines as detailed in the sections for Sidewalks, Curb Ramps or Ramps, Crosswalks, and Parking under the construction/reconstruction guidelines or resurfacing guidelines.

The designer shall comply with as many of the ADA guidelines as possible. If there are requirements of ADA that are not met, then the designer shall provide a useable condition to the maximum extent feasible. The designer shall provide justification within the project documentation why the guidelines were not met.

Pedestrian and Bicycle Facilities

Bicycle and pedestrian facilities shall be considered on all new construction and reconstruction projects in both rural and urban areas. Coordination with the SDDOT Bike and Pedestrian Coordinator on applicable options for the project corridor will be done during the scope and design phase.

In rural areas, applicable options may include paved shoulders on new construction and reconstruction projects and the coordination of the type and location of rumble strips to provide a minimum clear path in which a bicycle or pedestrian may safely travel.

Within town/city/urban limits, the inclusion of sidewalks, shared use paths, bike lanes, street crossings, pedestrian beacons/signals, signs, transit stops and facilities, and connecting pathways shall be considered, and if included in the project shall be designed and constructed so that all pedestrians, including people with disabilities and members of underserved communities, can travel safely and independently.

The need for bicyclists and pedestrians to cross corridors, as well as travel along them, shall also be considered. Even where bicyclists and pedestrians may not commonly use a particular travel corridor that is being improved or constructed, they may need to be able to cross that corridor safely and conveniently. The design of intersections and interchanges shall accommodate pedestrians and bicyclists in a manner that is safe, accessible and convenient.

The design of facilities for bicyclists and pedestrians should follow design guidelines and standards that are commonly used, such as the AASHTO *Guide for the Development of Bicycle Facilities,* AASHTO *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, National Association of City Transportation Guide (NACTO) *Urban Street Design Guide* and other applicable resources.

Additional information on design of pedestrian and bicycle facilities follow in this chapter.

SIDEWALKS

Existing sidewalk shall be replaced and/or new sidewalk placed as determined during the scoping process.

Sidewalks may be considered on all projects and should be installed on all new or reconstruction projects within a town or city or when non-motorized travel is anticipated. If sidewalk is not installed on the project, the design may include width for future sidewalk.

For construction/reconstruction projects, when it is determined that sidewalk is to be included as part of the project it shall be placed, at the cost of the State. If a Local Government Agency (LGA) and/or developer requests to include sidewalk on the State project for a future need, the cost may be by LGA and/or developer per agreement.

Sidewalks shall comply with ADA guidelines unless site constraints (buildings, elevations of adjacent properties and driveways, and steeper grades) create impossible or unfeasible design. If ADA guidelines can't be met the design upgrade should provide a useable condition to the maximum extent feasible. The designer shall provide documentation on what ADA guidelines are not met and provide justification.

Sidewalks within the Public Right-of-Way shall contain a Pedestrian Access Route (PAR). The PAR shall be a continuous and unobstructed walkway that provides accessibility in accordance with PROWAG.

The PAR shall consist of one or more of the following components: walkways, ramps, curb ramps (excluding flared sides) and landings, blended transitions, crosswalks, and pedestrian overpasses and underpasses, elevators, and platform lifts. Stairways and escalators are not part of a pedestrian access route.

If the public sidewalk is wider than the PAR; the portion of the public sidewalk outside the PAR is not required to be accessible. While the PAR is designed to be universally accessible, there are additional elements in the public sidewalk, such as stairs and handrails that are used by some pedestrians with disabilities. These elements must also meet applicable standards in order to be accessible to those who choose to use them.

Sidewalks should be located as far from the lane of vehicular traffic as practical. Sidewalks should be located such that a boulevard is provided between curb and gutter and sidewalk whenever practical. Boulevard width shall be a consideration during preliminary design, considering sign size requirements to provide the required clearances per the MUTCD, utility needs, and traffic volume, with the intent to provide maximum separation from curb and gutter to sidewalk in high volume urban areas, except in commercial areas. SDDOT typical width of sidewalk when boulevard is provided is 5'. When boulevard sidewalk is not an option, consideration should be given to provide sidewalk 6' or wider.

Grass boulevards are typically 5' wide or greater. Concrete boulevards are typically 2' to 3' wide but may vary depending on available ROW and property impacts. Boulevards widths between 3' and 5' should be concrete unless irrigation is provided by private party. Colored concrete boulevards may be considered to provide a visual separation from the PAR and curb and gutter. The LGA may provide input on the desired color to use. If the LGA desires stamped concrete the additional cost of stamping would be paid for by the LGA by agreement.

Minimum Clear Width

The PAR shall be 60 in. clear width with some exceptions:

1. The minimum continuous and unobstructed clear width of a PAR shall be 48 in. at driveways and alley crossings, accessible parallel parking locations with constraints, where necessary to make building entrances accessible, and at a point where street fixtures, including fixed or movable elements exist (power pole, fire hydrant, benches, newspaper racks, etc.). This width is exclusive of the width of the curb.
2. If a PAR has less than 60 in. clear width, passing spaces at least 60 in. by 60 in. shall be located at reasonable intervals not to exceed 200 ft. A T-intersection of two corridors or walks is an acceptable passing place.
3. For resurfacing projects the clear width can be reduced to 48 in. continuously and to 36 in. at a point where street fixtures, including fixed or movable elements exist (power pole, fire hydrant, benches, newspaper racks, etc.). This width is exclusive of the width of the curb.

Consideration should be made to increase the sidewalk clear width to 8 ft or greater in commercial areas or when used as a shared use path.

1. Consideration should be made to increase the sidewalk width approximately 2' (see bumper overhang in Figure 16-26) when curbside sidewalk and angle parking is provided so that a PAR of 60 in (48 in minimum) can be maintained. An additional 2' paved buffer strip should also be considered where the sidewalk runs adjacent to a building, as in a downtown setting.

Cross Slope

1. The recommended cross slope on a PAR shall be 1.5% with a maximum of 50:1 (2%).

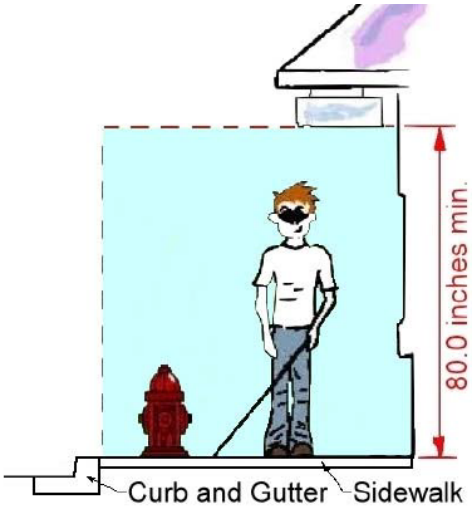
Grade

1. The PAR grade shall generally be no steeper than 20:1 (5%).
2. Where the adjacent street or highway exceeds 20:1 (5%), the grade of the PAR shall not exceed the general grade established for the adjacent street or highway.

Surfaces

- Surfaces of a PAR shall be as free of discontinuities and as visually uniform as possible. Surfaces may contain control joints and similar joints that are associated with established construction practices for those surfaces or structures that include a PAR.
  - Utility covers and grates should not be located in walkways, curb ramps, landings, transitions, and gutters within the PAR. Where existing utilities are not being relocated as part of the project, locate the utility covers to provide the most accessible PAR possible. For example, the design might provide a slight horizontal shift in an existing ramp to provide a clear 48 in. width within the 60 in. ramp. Where access covers must be located on any portion of the curb ramp, landings, etc. they shall meet the surface requirements of the PAR (firm, stable, slip resistant, and flush)
  - Surface discontinuities shall not exceed 1/2 in. maximum. Vertical discontinuities between 1/4 in. and 1/2 in. shall be beveled with a slope no greater than 2:1 (50%). Refer to Figure 16-8.

Vertical Clearance



- The minimum vertical clearance along the PAR shall be 80 inches. The MUTCD requires the minimum height for bottom of signs to be 7.0 ft. The required clear area must be maintained without obstruction.

Figure 16-2 Minimum Vertical Clearance

Sidewalks, which go under a roadway or structure, shall have a minimum of 10 ft of vertical clearance between the top of the sidewalk and lowest point on the overhead structure (bridge, box culvert, sign, etc).

Thickness

Sidewalks shall be designed with a minimum thickness of 4 in., except at entrances. Thickness of the sidewalk at residential entrances shall be a minimum of 6 in., with commercial entrances 6 in. to 8 in., depending upon usage. Consider 6 in. sidewalks in urban areas where cities routinely remove snow from the sidewalk with larger equipment. Varying sidewalk thickness will have individual bid items and will be tabulated accordingly.

Entrances (Driveways)

1. To accommodate accessibility requirements for sidewalk design at entrance locations, various design options are shown in Figure 16-4. The most important element of these solutions is to provide a continuous clear PAR with a minimum width of 4 feet.
2. A boulevard sidewalk, as shown in Figure 16-4 Option (d) is preferred to be used where practical.
3. For more information on entrance width and driveway profiles, see Chapter 12 – Intersections.

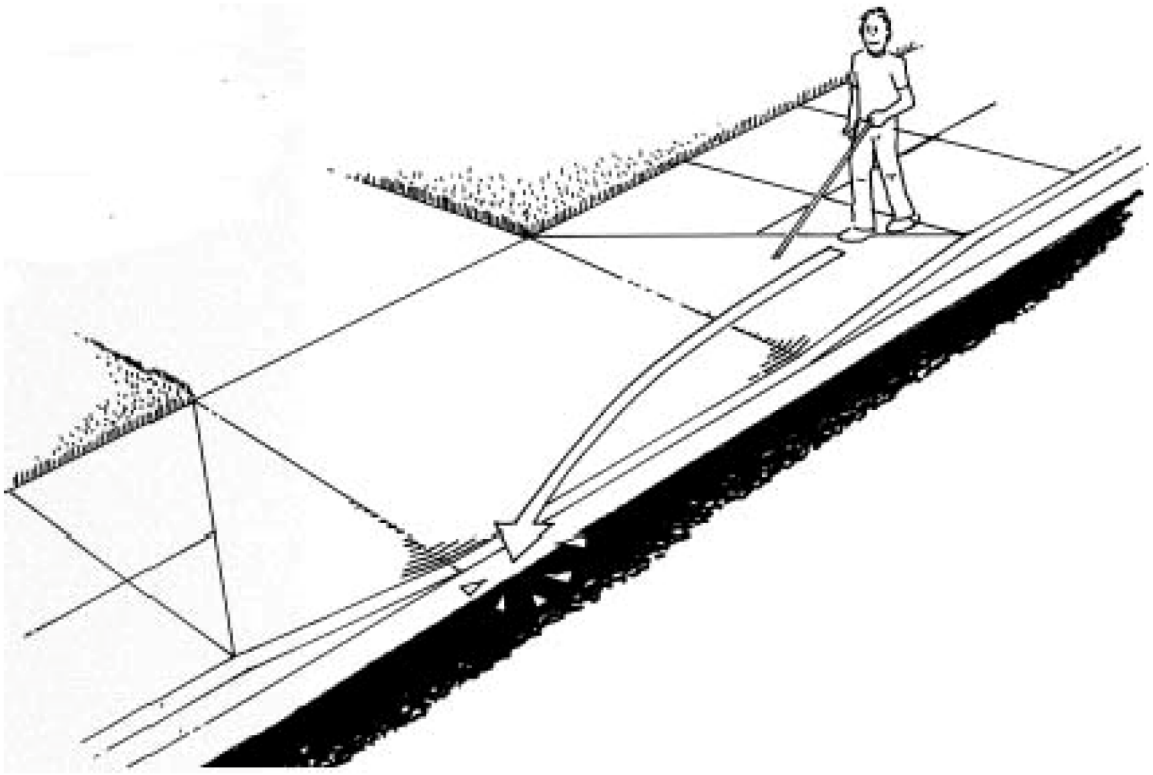


Figure 16-3 Noncompliant Sidewalk at Entrances

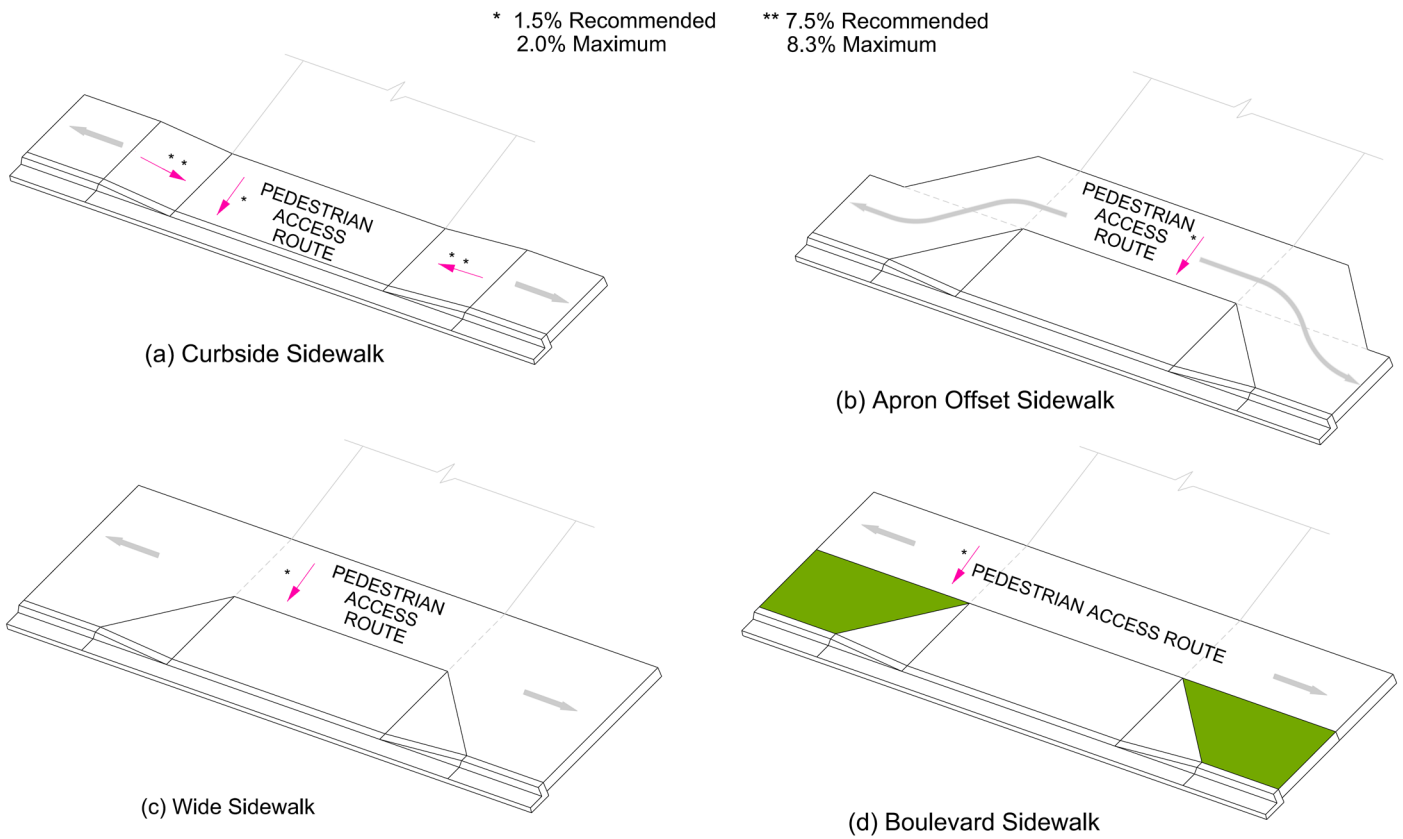


Figure 16-4 Sidewalk Design at Entrances

Accessibility to Buildings

Public sidewalks serve the entrances of Title II and Title III building owners that adjoin the public right-of-way. PROWAG requires SDDOT to coordinate cooperative efforts with building owners and encourage building owners to provide an accessible entrance in conjunction with the SDDOT project. The designer shall refer to Figures 16-5, 16-6 and 16-7 and provide an accessible pathway to the building door if required. If a ramp is required to provide accessibility to the building than most likely handrail will also be required. If the entrance to the building does not need to be accessible and there are stairs and the project disturbs or changes the stairs (example – if the project changes the elevation of the sidewalk which makes the first riser of the stairs a different height than the rest) than the designer is required to reconstruct the stairs to a building standard and the stairs will require to have handrail. A flat area or landing is required in front of all building entrances according to most modern building codes whether they are required to be accessible or not. Refer to Figure 16-5 & 16-6 for the landing requirements.

The designer shall work with the Office of Bridge Design to provide the required stairs and handrail.

Type of Use			
Approach Direction	Door or Gate Side	Perpendicular Clearance	Latch Side Clearance
From front	Pull	60 in.	18 in.
From hinge side	Pull	60 in.	36 in.
From hinge side	Pull	54 in.	42 in.
From latch side	Pull	* 48 in.	24 in.

* Add 6 in. if closure is provided.

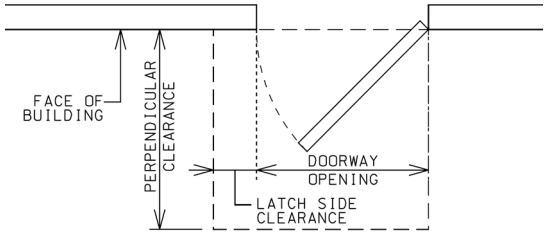


Figure 16-5 Maneuvering Clearance at Manual Swinging Doors & Gates

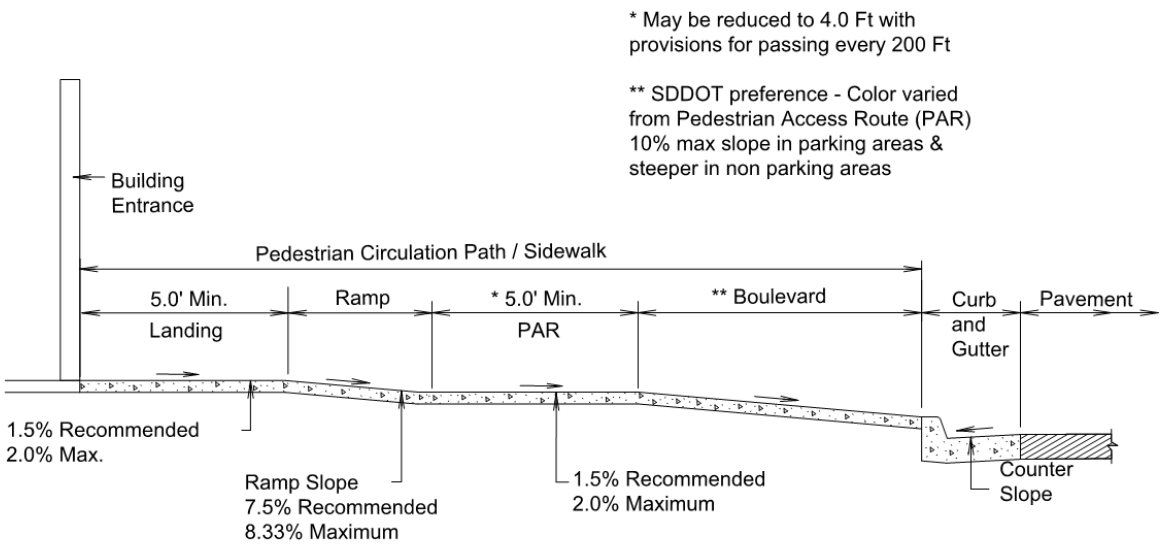
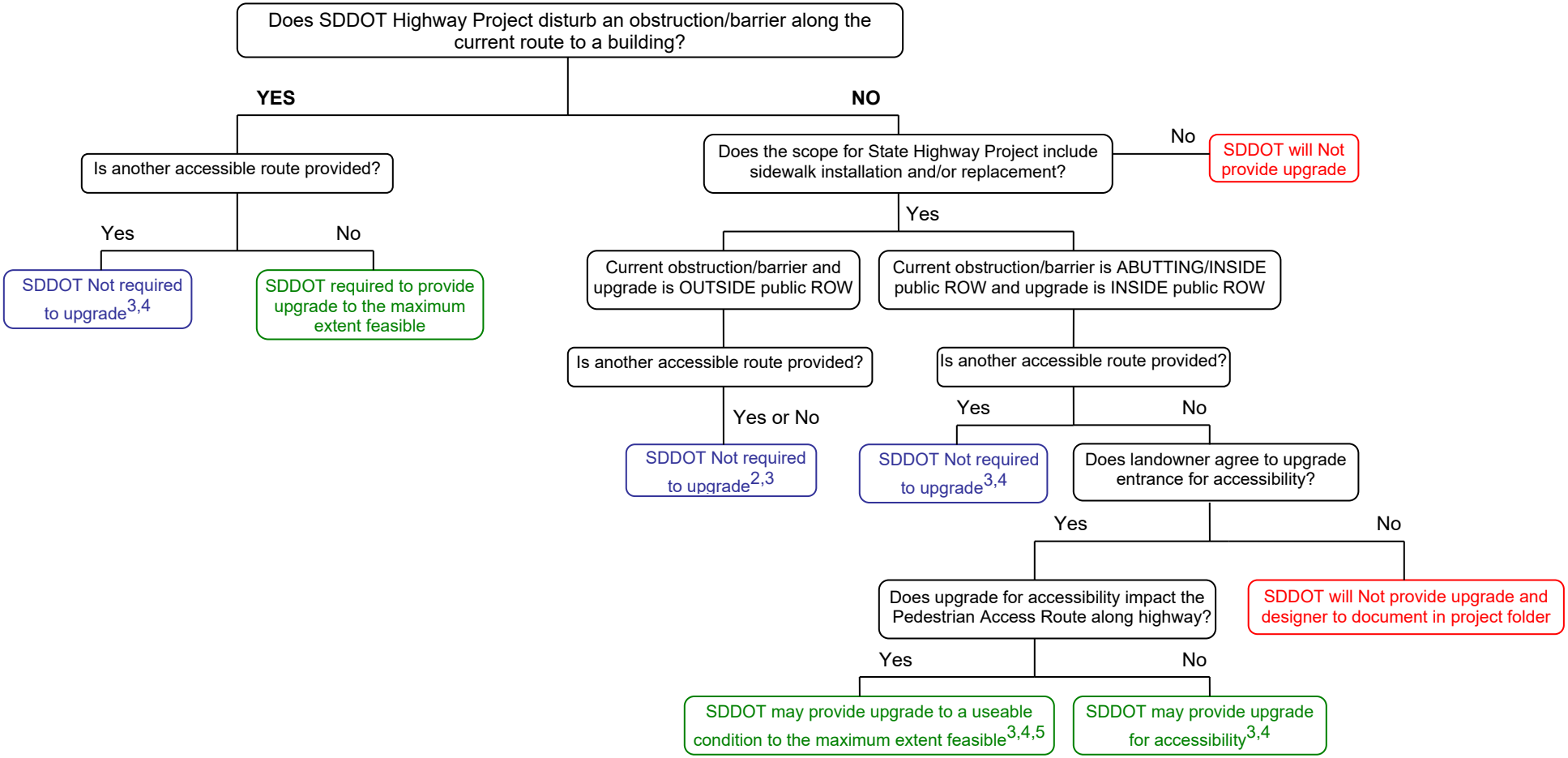


Figure 16-6 Wide Sidewalk with Vertical Elevation Change between Curb & Gutter and Building Entrance



1. Guidelines are for Title II (governments) and Title III (commercial facility or place of public accommodation) entities. Requests made from a private residence may be considered during the planning and/or design phase on a case by case basis and costs may be incurred by landowner based on negotiations.
2. For Title III entities, if the landowner requests an upgrade to obstruction/barrier that is outside the Public ROW, upgrade will not be included in the plans and designer will advise landowner to work with Contractor during construction.
3. For Title II entities, SDDOT will coordinate cooperative efforts with landowners and encourage landowner to provide accessible entrance in conjunction with SDDOT project. SDDOT may provide design service for accessibility. Project Development may prepare an agreement between SDDOT and Government Entity for reimbursement of design and construction costs incurred by SDDOT. If an agreement is prepared it should be done during the scope phase or prior to the design phase beginning.
4. For Title III entities, SDDOT will coordinate cooperative efforts with landowners and encourage landowner to provide accessible entrance in conjunction with SDDOT project. SDDOT may provide design service for accessibility. Project Development may prepare an agreement between SDDOT and City or County for reimbursement of design and construction costs incurred by SDDOT and future maintenance of pedestrian access route. If an agreement is prepared it should be done during the scope phase or prior to the design phase beginning.
5. Upgrade my result in compromising various design criteria based on the site. Designer shall document design decisions in the project folder.

Figure 16-7 Guidelines for Providing Accessibility to Buildings[1] (other than Private Residences) Along SDDOT Highway Project

RAMPS

Any part of a PAR that is not adjacent to a street or highway with a slope greater than 20:1 (5%) shall be considered a ramp and shall comply with this section.

Wherever possible provide a walkway with stairs in addition to the walkway with ramps for use by those individuals for whom distance presents a greater barrier than steps.

Width

- The preferred ramp width is 60 in. wide or wider, in the case of a shared use path, as per standard plates.
- In areas of restricted right-of-way or where the ramp connects to an existing 48 in. sidewalk, the minimum width of a ramp shall be 48 in.
- The minimum clear width of a ramp run and, where handrails are provided, the clear width between handrails shall be 36 in. minimum.

Ramp Runs

- Ramp runs shall have a running slope between 5% and 7.5% recommended with a maximum of 8.3%.
- The recommended cross slope of ramp runs shall be 1.5% with a maximum of 2%.
- The maximum rise for any run shall be 30 in.
- Ramp runs with a rise greater than 6 in. shall have handrails.

Landing

- Ramps shall have landings at the top and the bottom of each ramp run.
- The landing clear width shall be at least as wide as the widest ramp run leading to the landing. The landing clear length shall be 60 in. long minimum.
- Ramps that change direction between runs at landings are considered turning spaces and shall be 60 in. by 60 in. minimum.

Edge Conditions

- Ramps and landings with drop-offs shall have curbs, walls, railings, or projecting surfaces that prevent people from slipping off the ramp. Curbs shall be a minimum of 2 in. high.

Handrails

- Handrails are required if a ramp run has a rise greater than 6 in.
- Handrails shall be provided along both sides of ramp segments and stairs.
- Handrails are designed by the Office of Bridge Design

CURB RAMPS

Curb ramp requirements at intersections and crosswalks must be considered in sidewalk designs.

- A curb ramp shall be provided wherever a PAR crosses a curb.
- If at least one quadrant of an intersection has a sidewalk, then consider installing curb ramps at all quadrants.
- A separate curb ramp or flush turning space is not required for each direction of travel.
- A turning space is required at each curb ramp, except at unsignalized driveways.
- When two ramps are used, maintaining a minimum 4 ft section of full height curb between the two ramps is desirable.
- Provide adequate drainage to prevent the accumulation of water and debris on or at the bottom of the ramp.
- The bottom of diagonal curb ramps shall have 48 in. diameter minimum clear space as shown in Figure 16-14.
- Separate curb ramps should be provided for each direction of pedestrian travel unless there is an existing physical constraint preventing it.
- If PAR exists at a Tee Intersection then separate curb ramps should be provided at all quadrants. If a physical constraint is present then engineering judgement shall be used to determine feasibility of placing a curb ramp vs removing the physical constraint.

Placement

- The curb ramp shall be aligned within a legal crosswalk or parking access aisle.
- Curb ramps at marked crossings shall be wholly contained within the markings of the crosswalk, excluding any flared sides.
- Curb ramps and flush turning spaces shall be wholly contained within the public sidewalk and shall not protrude into the vehicular way.
- Curb ramps are permitted to protrude into accessible parking aisles if they do not intrude into the maneuvering and unloading areas.

Width

- The preferred curb ramp width is 60 in. wide or wider, in the case of a shared use path, as per standard plates.
- In areas of restricted right-of-way or where the curb connects to an existing 48 in. sidewalk, the minimum width of a curb ramp shall be 48 in., exclusive of flared sides.
- For resurfacing projects the clear width of curb ramps can be reduced to 48 in., exclusive of flared sides, however 60 in. is still the desired width.

Cross Slope

- The recommended curb ramp cross slope shall be 1.5% with a maximum of 2%.
- The recommended cross slope for turning spaces shall be 1.5% with a maximum of 2% in any direction.

Running Slope

- The running slope shall be 5% minimum and 7.5% recommended with a maximum 8.3% but shall not require the ramp length to exceed 15 ft.
- Limiting ramps to 7.5% recommended with a maximum 8.3% on steep routes will result in a slight increase in grade on the balance of the route.
- For resurfacing projects curb ramps to be constructed where space limitations prohibit the use of a 8.3% slope or less may have slopes and rises as follows:
- A slope between 8.3% and 10% is allowed for a maximum rise of 6 in.
- A slope between 10% and 12.5% is allowed for a maximum rise of 3 in. A slope steeper than 12.5% is not allowed.

Curb Ramp Lengths

- Most of the curb ramp standard plates include a standard curb ramp length. Where the standard plate does not include a length or there is a need to adjust the standard length, the length is to be shown on the curb and gutter layout sheet.
- Where curb ramps are shorter than the minimum curb ramp length or the curb height is less than 6 in., make the necessary drainage provisions when water is expected to over top the curb ramp.

The typical minimum curb ramp length is determined as follows:

$$\text{Minimum Curb Ramp Length or Curb Transition} = \frac{\text{Curb Height}}{\text{(Max. Grade* – Adjacent Grade**)}}$$

* Maximum grade or curb ramp grade

** The adjacent grade runs parallel to the direction of the ramp. The grade can be the grade of the adjacent roadway (Type 3 Curb Ramp) or the boulevard cross slope (Type 1 Curb Ramp).

EXAMPLE:
Maximum grade = 8.3%
Longitudinal grade of adjacent roadway = 3%
Curb height for a standard 6 in. curb = 6 in.
Minimum Type 3 Curb Ramp Length = 0.5 ft / (0.083 – 0.030) = 9.43 ft

Turning Space

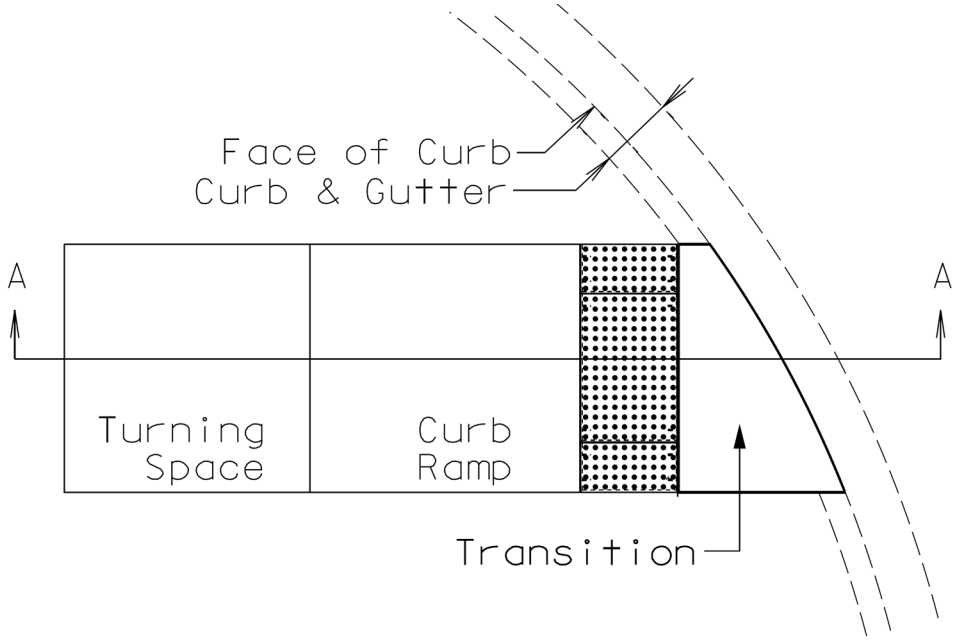
A turning space differs from a landing where as a turning space is required when a change in direction may occur along the PAR. Turning spaces are required at the top and bottom of curb ramps.

A turning space is not required when the running slope is less than 20:1 (5%) and there is no change in direction required.

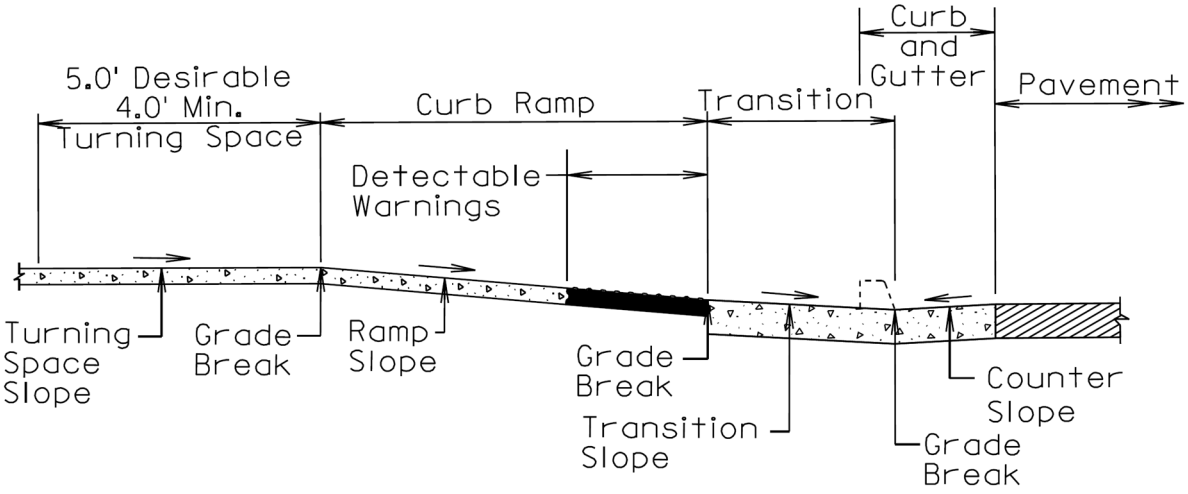
- The recommended size of turning spaces are 60 in by 60 in.
- At perpendicular curb ramps a turning space, 48 in. minimum by 48 in., minimum shall be provided at the top of the curb ramp. Where the turning space is constrained at the back-of-sidewalk, the turning space shall be 48 in. minimum by 60 in. minimum. The 60 in. dimension shall be provided in the direction of the ramp run.
- At parallel curb ramps a turning space 48 in. minimum by 48 in. minimum shall be provided at the bottom of the ramp run. If the turning space is constrained on 2 or more sides, the turning space shall be 48 in. minimum by 60 in. minimum. The 60 in. dimension shall be provided in the direction of the pedestrian street crossing.
- Turning space may serve multiple curb ramps or overlap with other landings and clear space.
- Running and cross slope at midblock crossings shall be permitted to be warped to meet street or highway grade.
- For resurfacing projects the turning space shall be at least as wide as the curb ramp run leading to it.

Transition

The following is an example of a Transition, Curb Ramp, and Turning Space. The transition may be used at the bottom of a single ramp as shown below.



Plan View



A-A Elevation View

Figure 16-8 Transition

Blended Transition

- Blended transitions are raised pedestrian street crossings, depressed corners, or similar connections between PARs at the level of the sidewalk and the level of the pedestrian street crossing that have a grade of 5 percent or less.

Counter Slope

- The counter slope of the gutter or street at the foot of a curb ramp, blended transitions, turning space, or transition shall be 20:1 (5%) maximum.

Edge Conditions

- Flared sides with a slope of 10% maximum, measured parallel to the curb line, shall be provided where a pedestrian circulation path crosses the curb ramp.
- Curb transitions shall be a minimum of 6 ft long, a maximum of 10 ft long, and the curb transition slope shall not be steeper than a 10% unless stated otherwise in the plans.
- Where pedestrians would not normally walk across the ramp or if protected from cross travel the designer may consider returned curbs or a 2 ft transition.

Surfaces

- Surfaces may contain control joints and similar joints that are associated with established construction practices for those surfaces or structures that include a PAR. A vertical elevation change between 1/4 in. and 1/2 in. shall be beveled with a slope of 50%. Refer to Figure 16-9
- Surfaces with individual components laid out of plane and those that are heavily textured, rough, or chamfered, will greatly increase rolling resistance and will subject pedestrians who use wheelchairs, scooters, and rolling walkers to the stressful (and often painful) effects of vibration. It is highly desirable to minimize surface discontinuities; when discontinuities on the PAR are unavoidable, they should be widely separated.
- In new construction, utility covers and grates should not be located in walkways, curb ramps, turning space, transitions, and gutters within the PAR. However, where existing utilities are not being relocated as part of the project, locate the utility covers to provide the most accessible PAR possible. For example the design might provide a slight horizontal shift in an existing ramp to provide a clear 48 in. width within the 60 in. ramp. Where access covers must be located on any portion of the curb ramp, they shall meet the surface requirements of the PAR (firm, stable, slip resistant, and flush)

Vertical Grade Breaks and Lips

- Transitions from ramps to sidewalks, gutters, or streets shall be flush and free of abrupt changes.
- A vertical elevation change between 1/4 in. and 1/2 in. shall be beveled with a slope no greater than 2:1 (50%).
- A vertical elevation change greater than 1/2 in. shall be constructed with a recommended 7.5% or less slope to a maximum of 8.3% slope.

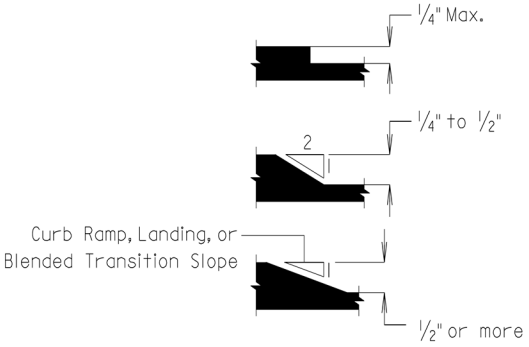


Figure 16-9 Vertical Elevation Changes

Curb Ramp Types

- Parallel curb ramps have the running slope parallel to the curb line (or in-line with sidewalk direction of travel and have a turning space at the bottom of the curb ramp. The following is one example shown for illustration purposes only.

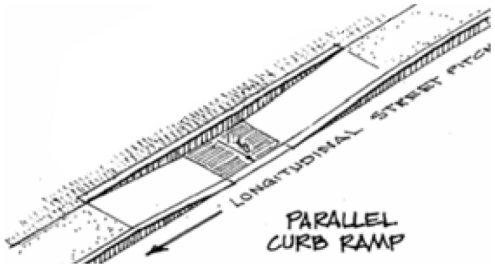


Figure 16-10 Parallel Curb Ramp

- Perpendicular curb ramps have the running slope perpendicular to the curb line, meet the gutter at right angles, and have a turning space at the top of the curb ramp. The following is one example shown for illustration purposes only.

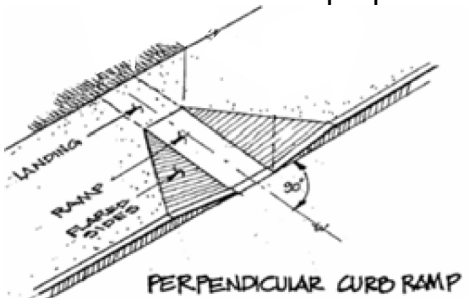


Figure 16-11 Perpendicular Curb Ramp

- The following are other illustrations of Parallel and Perpendicular Curb Ramps used in combination. Combining curb ramp types may be helpful where ROW is limited.

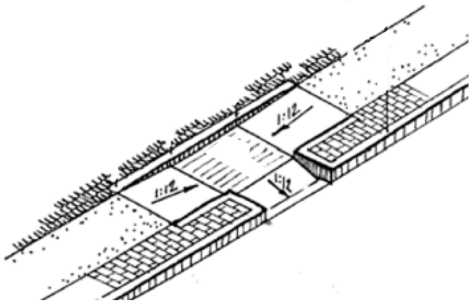


Figure 16-12 Combination Curb Ramp

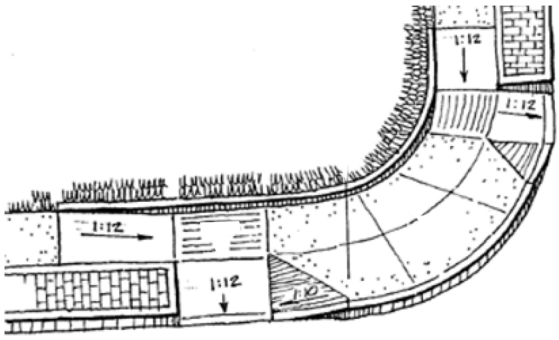


Figure 16-13 Combination Curb Ramp

- Single diagonal curb ramps are least desirable. If used there must be a 48 in. minimum clear space at the bottom of the ramp outside of motor vehicle travel lanes.

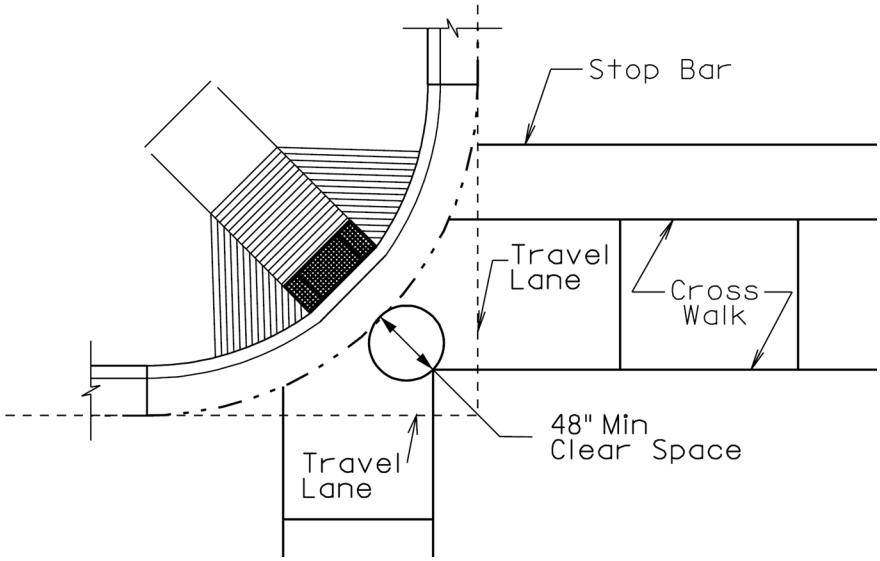


Figure 16-14 Diagonal Curb Ramp

Method for Selecting Curb Ramp Type

Ideally, curb ramps throughout a project would be the same type and location within the curb radii to provide consistent cues to the user. Unique site conditions such as ROW, terrain, building locations, and roadway grades and skew angles, greatly limit the designer's choices. While there is no one right answer, the following guidance is provided to assist the designer in selecting the type of curb ramps for each intersection quadrant.

Paragraphs 1 through 5 below are selection criteria. 1 is considered the most desirable type of curb ramp while 5 is considered the least desirable type of curb ramp. The designer should identify which curb ramp type(s) are possible for each quadrant. Since consistency within an intersection is also important, the designer might choose a less desirable curb ramp type to provide consistency within the intersection or better yet, throughout the project.

Note: Figure 16-15 to Figure 16-20 are for illustration purposes only. The actual curb ramp configuration will depend on the sidewalk width, curb radius, standard plate, etc.

1. Perpendicular curb ramps located in the tangent section of curb, outside the curb radius are preferred. These curb ramps are typically parallel with the cross walk and provide directionality to pedestrians. If the radius is too great to meet other design requirements consider 2.

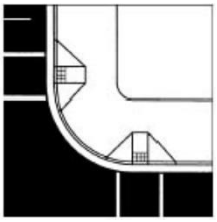


Figure 16-15 Perpendicular Curb Ramps

2. When the roadway grade in front of the curb ramp is 2% or less and the curb ramp cannot be installed in the tangent section of the curb, consider perpendicular curb ramps with transition. These curb ramps are typically parallel with the cross walk and provide directionality to the user.

Figure 16-16 Perpendicular Curb Ramps with Transition

3. When the roadway grade in front of the curb ramp is greater than 2% and the curb ramp cannot be installed in the tangent section of curb, consider a perpendicular curb ramp that is skewed to intersect the curb at 90 degrees (with no transition) or parallel curb ramp. While these curb ramps do not provide directionality, they provide stability for users with walking devices and wheel chairs.

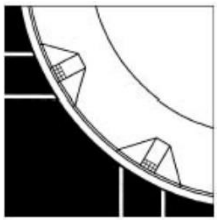


Figure 16-17 Perpendicular Curb Ramps with no Transition

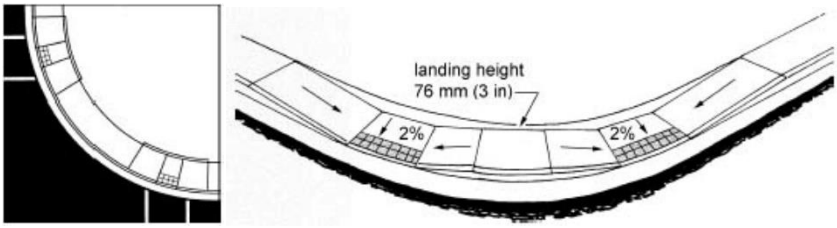


Figure 16-18 Parallel Curb Ramps

4. Combination curb ramps should be considered when ROW width is limited. Combination ramps may be used with any of the above mentioned ramps.

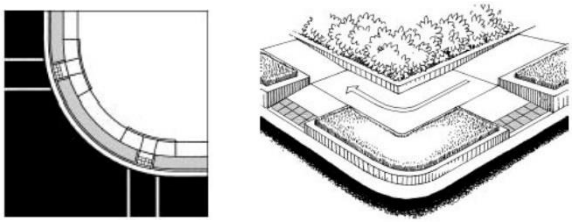


Figure 16-19 Combination Curb Ramps

Rule of Thumb for curb height behind Type 3 Curb Ramp or Combination Curb Ramps:

- Up to 9” regular curb
- Over 12” the curb becomes a Type C retaining Wall
- 9” to 12” depends on what is behind curb. Check with the

5. Single, diagonal curb ramps are the least desirable. When possible, limit to using single, diagonal curb ramps to sites where existing utilities prevent installation of two ramps, where adjacent obstacles limit sight distance, at intersections with large radii, or where single curb ramps are consistent with what has been used in the area.

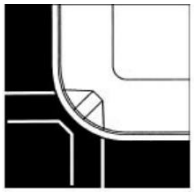


Figure 16-20 Single Diagonal Curb Ramp

Detectable Warnings

- Detectable warnings shall be provided:
  - To advise pedestrians of an upcoming change from pedestrian to vehicular way, but not at unsignalized driveways (i.e. commercial and residential driveways).
  - Where commercial driveways are provided with traffic control devices or otherwise are permitted to operate like a public street.
  - Where a rail system crosses a pedestrian way.
  - At cuts through islands and medians.
- The detectable warning shall extend 24 in. minimum in the direction of pedestrian travel and the full width of the curb ramp (exclusive of flares).
- The detectable warnings shall contrast visually with adjacent gutter, street or highway, and walkway surface. Plans will designate contrast if different than standard.
- For resurfacing projects an alternative detectable warning to consider is a glued down type (if no other work will be done on existing curb ramp to sidewalk). Consistency on application of detectable warnings should be provided within a project.

Typically the detectable warning panel shall be placed perpendicular to the ramp (refer to Figure 16-21). One corner of the detectable warning must be at the back of curb; no other point on the leading edge of the detectable warning may be more than 5 ft from the back of the curb.

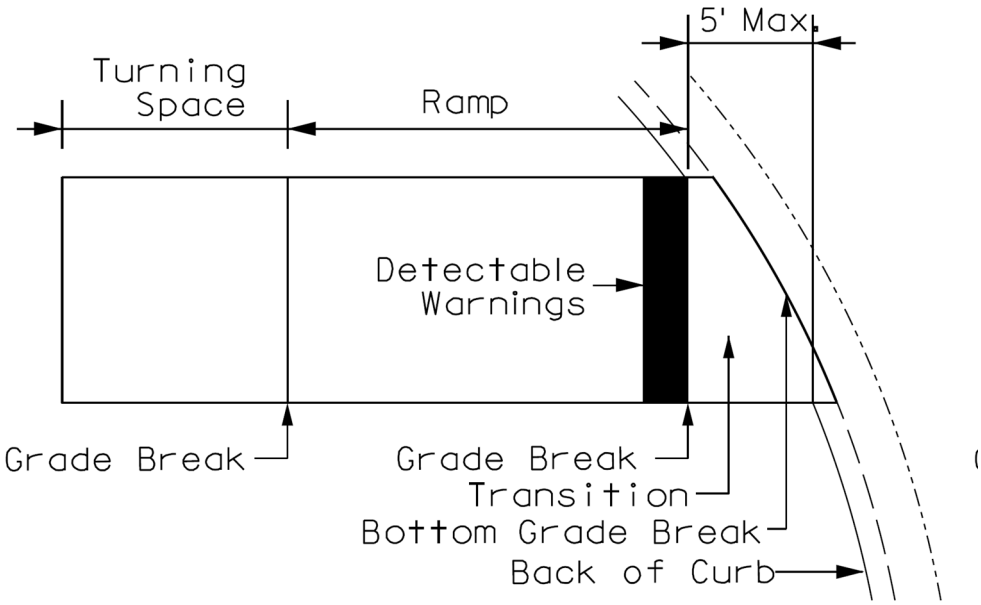


Figure 16-21 Detectable Warning Placement (Transition 5 ft Max.)

Where the 5 ft cannot be achieved, the detectable warnings shall be placed on the lower landing or transition at the back of curb (refer to Figure 16-22). Alignment of the truncated domes shall be perpendicular to the gutter flow line.

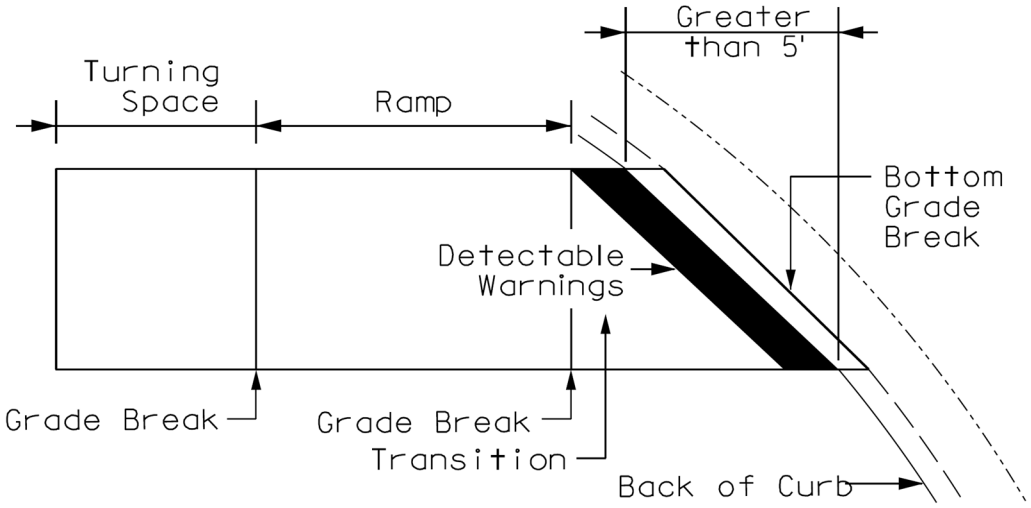


Figure 16-22 Detectable Warning Placement (Transition Greater than 5 ft)

Locate detectable warnings at Rail Crossings so the edge nearest the rail crossing is 6 ft minimum and 15 ft maximum from the centerline of the nearest rail. Alignment of the truncated domes shall be parallel with the direction of wheelchair travel.

PEDESTRIAN PUSH BUTTONS AT CURB RAMPS

Design Considerations for pedestrian push buttons:

- Signalized, (or potential for signalized in the future), always design curb ramps to accommodate two push button poles.
- Typically pedestrian push button poles will be used rather than push buttons being mounted on signal poles.
- Pedestrian push button poles are to be placed in front of the curb located on the backside of ramp (i.e. Type 3 curb ramps).
- The alignments of sidewalks around the push buttons and curb ramps are designer's choice (straight or curved).
- There should be one full unobstructed side of clear space at pedestrian push buttons (either in front or behind push button). The minimum clear width shall be 4.0 ft, exclusive of the curb.

Pedestrian push buttons should be located as referenced below:

(A) Within 10 ft from the front face of curb (ideally 1.5' to 6').
(B) Where two push buttons are provided, the push buttons should have at least 10 ft of separation from each other.
(C) If two curb ramps are used, the push button should be within 5 ft of the backside of the crosswalk.
(D) The push button should be mounted adjacent to a clear ground space (within 10" maximum reach). The clear ground space shall be at least 30 in. x 48 in. and shall slope no more than 50:1 (2%) in any direction. The push button shall be centered on either side of the clear ground space (either the 30 in. or 48 in. side). The 30 in. x 48 in. clear ground space shouldn't touch the detectable warning panel.
(E) The push button should face the edge of roadway.
(F) The push button face should be parallel to the crosswalk being used.

The push button poles shall not interfere with the minimum clear width of the PAR.

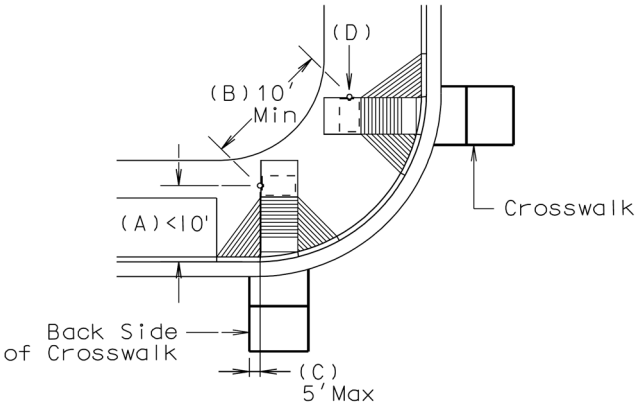


Figure 16-23 Push button Relationship to Curb Ramp & Crosswalk

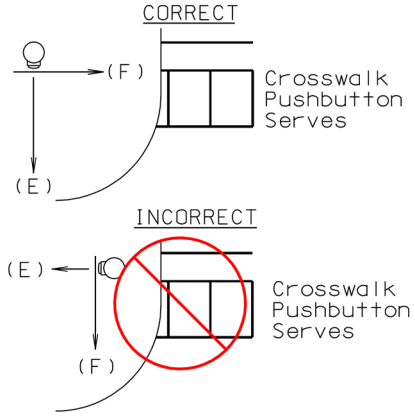


Figure 16-24 Push button Orientation to Crosswalk

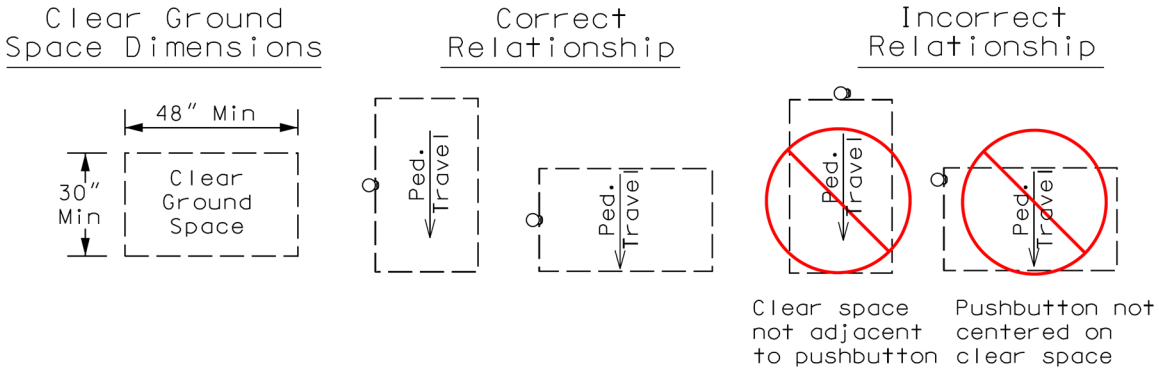


Figure 16-25 Push button Relationship to Clear Ground Space

CROSSWALKS

- At crossings with stop or yield control the crosswalk cross slope (road profile) shall be 2% maximum.
- At crossings without stop control the crosswalk cross slope (road profile) shall be 5% maximum. This is where there is no yield or stop sign, or where there is a traffic signal that is designed for the green phase.
- Midblock crossings shall be permitted to be warped to meet street or highway grade.
- The crosswalk running grade shall be a maximum of 5%, measured parallel to the direction of pedestrian travel in the crosswalk.
- Crosswalk markings are required at signalized intersections and midblock crossings.
- The minimum crosswalk width at locations with traffic signals is 8 ft.
- The minimum crosswalk width at unsignalized locations is 6 ft.
- The 48 in. minimum clear space is only needed when a single curb ramp is used at the intersection. The clear space shall be 2%maximum and fully contained within the crosswalk. Therefore, the cross walk location will be controlled by the 4’ landing. See Figure 16-14
- The AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities should be used when considering midblock crossings.

Medians and Pedestrian Refuge Islands

- Median and pedestrian refuge islands shall be 6 ft minimum in length in the direction of pedestrian travel and 60 in. wide.
- Corner islands should be raised and designed with curb ramps or a pedestrian cut-through. Cut-through designs should provide 60 in. minimum of clear space in all directions.
- The portion of the crossing through the raised island shall be designed so that water will not accumulate on walking surfaces.
- Detectable warnings at cut-through islands shall be located at the curb line in-line with the face of curb and shall be separated by a 2 ft minimum length of walkway without detectable warnings.
- Detectable warnings where the island has no curb shall be located at the edge of roadway.

Stop Bar and Crosswalk Location

As per the current edition of the *Manual on Traffic Control Devices (MUTCD)* http://mutcd.fhwa.dot.gov/index.htm if used, stop and yield lines should be placed a minimum of 4 feet in advance of the nearest crosswalk line at controlled intersections, except for yield lines at roundabouts as provided for in Section 3C.04 and at midblock crosswalks. In the absence of a marked crosswalk, the stop line or yield line should be placed at the desired stopping or yielding point, but should not be placed more than 30 feet or less than 4 feet from the nearest edge of the intersecting traveled way.

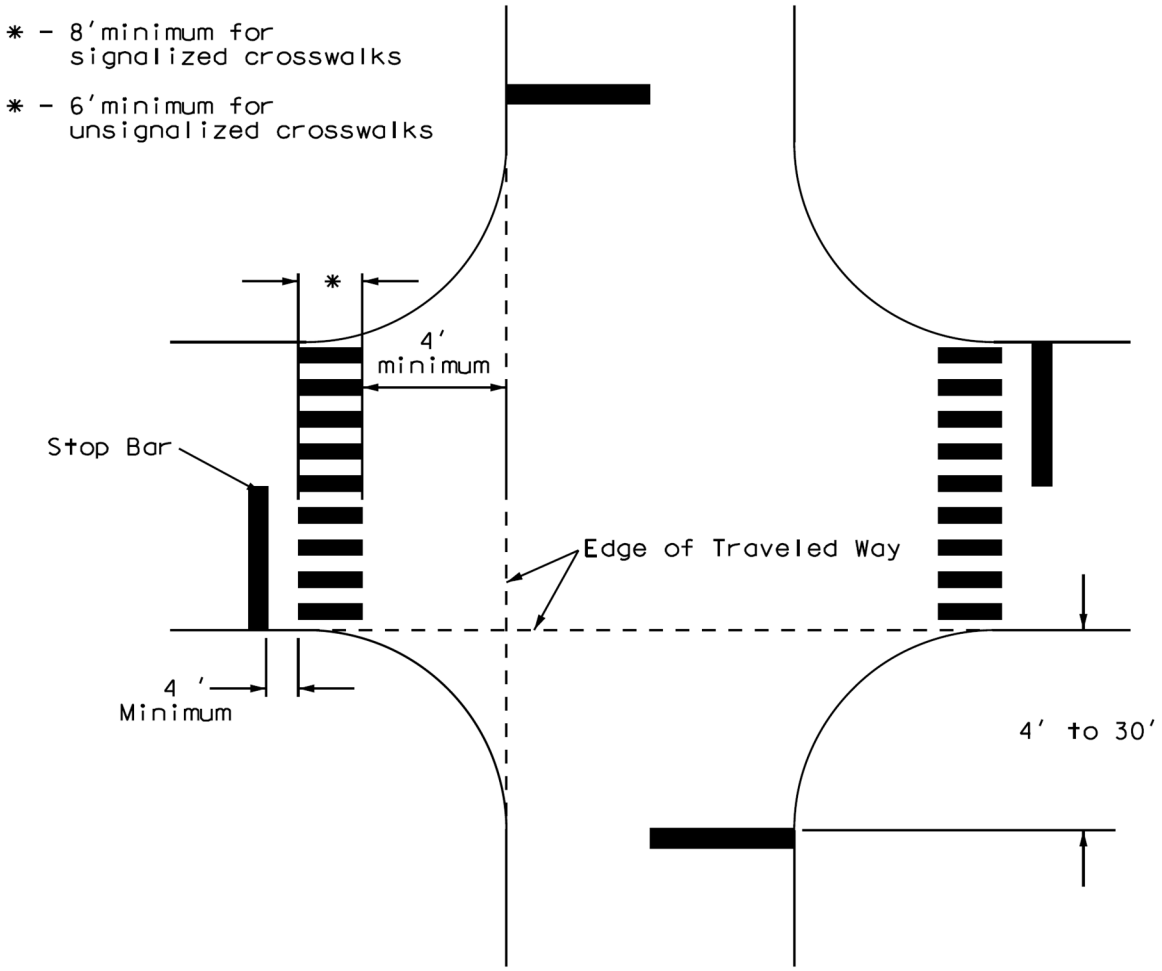


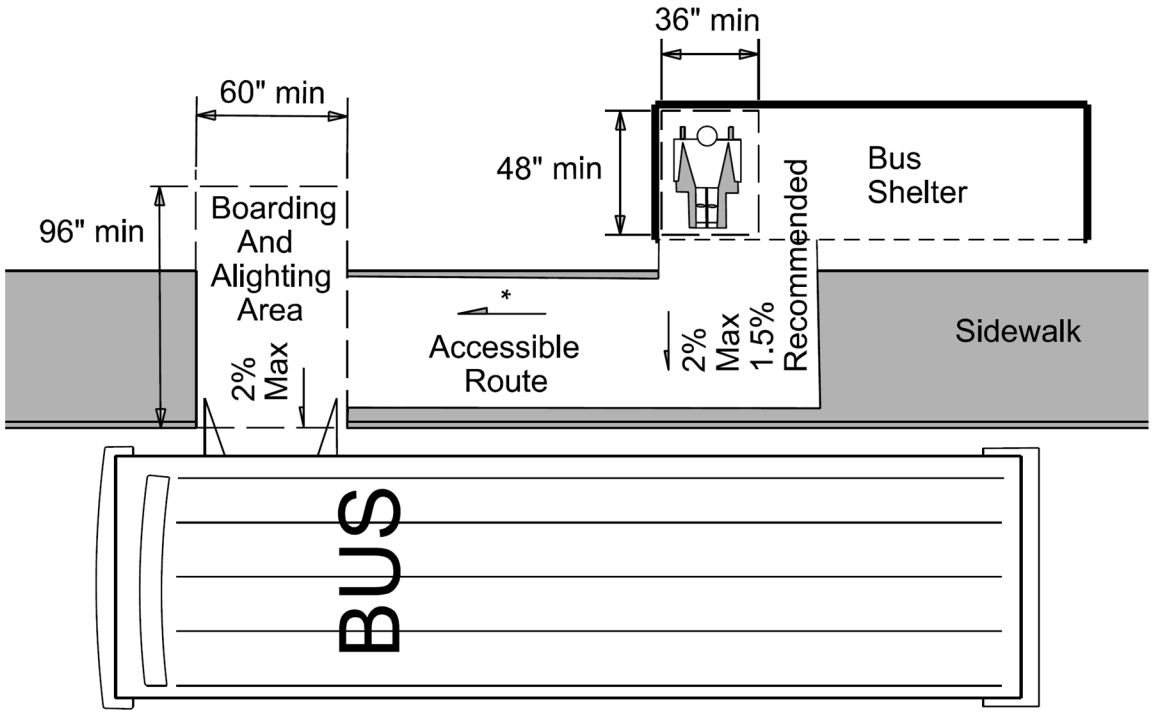
Figure 16-26 Stop Bar Location

BUS\TRANSIT STOPS and SHELTERS

Refer to AASTO "Guide for Geometric Design of Transit Facilities on Highways and Streets" Chapter 5 - Guidelines for Bus Facilities on Streets and Roadways. At a minimum the AASHTO Green Book guidance can be used in certain situations as approved by the Chief Road Design Engineer.

Boarding & Alighting Area

- Size: 8' minimum perpendicular to curb by 5' minimum parallel to curb. Recommendation: create minimum 8' sidewalk entire length of bus stop.
- Grade: Recommended 1.5% to a maximum of 2.0% perpendicular to curb; match street grade parallel to street
- Connected to PAR



* Slope may be the same as the roadway

Figure 16-27 Bus/Transit Stop and Shelter

Bus Shelter

- Clear floor space shall be 36 inches minimum x 48 inches minimum entirely within the shelter.
- Clear space slope is 1.5% recommended to a maximum of 2.0% in all directions
- Connected to PAR

PARKING

Parking Along Highways

To accommodate any parking along a route where the main function is to provide through movement, there should not be any capacity problems. If capacity becomes a problem, additional lanes should be added or parking should be removed. Any parking that presently exists and is needed will be discussed between the Department and the local community to determine needs and parking solutions when reconstructing or resurfacing the highway. Whenever possible, parking should be removed from the highway as on-street parking reduces capacity, impedes traffic flow, and increases crash potential.

AASHTO Green Book states "*When on-street parking is to be an element of design, parallel parking should be considered. Under certain circumstances, angle parking is an allowable form of street parking. The type of on-street parking selected should depend on the specific function and width of the street, the adjacent land use, traffic volume, as well as existing and anticipated traffic operations. Angle parking presents special problems because of the varying length of vehicles and the sight distance problems associated with vans and recreational vehicles. The extra length of such vehicles may interfere with the traveled way".*

When reviewing parking options along highways, bicycle and pedestrian facilities should also be considered. Bicycle lanes adjacent to parallel or angled parking should be located and designed with safety considerations for both modes. Bicycle lanes at intersections, shared use path crossings at intersections and the effects of parking on right turn movement conflicts with bicycles and pedestrians should be considered. Chapter 4 of the AASHTO *Guide for Development of Bicycle Facilities* provides some good references on these topics or consult with the Bike and Pedestrian Coordinator.

Parking modifications should be discussed with local city officials, especially when eliminating parking.

On-Street Parking (Accessibility)

Where on-street parking is marked or metered, accessible parking spaces shall be provided on the block perimeter in accordance with Table 16-2. Accessible on street parking spaces are best located where the street has the least crown and grade and close to key destinations. Adjacent sidewalks space should be free of obstructions (including curb ramps) to permit deployment of a van side-lift.

Table 16-2 Accessibility Requirements for On Street Parking

Total Number of Marked or Metered Parking Spaces on the Block Perimeter	Minimum Required Number of Accessible Parking Spaces
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 and over	4% of Total

- Accessible parking spaces should be located to provide the shortest possible accessible route of travel to an accessible facility.
- Parallel parking spaces shall be a minimum of 8 ft wide. Where the width of the adjacent walkway exceeds 14 ft, an access aisle at least 5 ft wide shall be provided at street level the full length of the accessible parking space and shall connect to a PAR serving the space. An access aisle is not required where the width of the adjacent walkway is less than or equal to 14 ft. When an access aisle is not provided, the accessible parking space shall be located at either end of the block.
- Length of parallel parking stalls shall be a minimum of 20 ft for exterior parking spots and shall be 22’ to 26’ for interior parking stalls.
- Angle parking access aisle shall be 8 ft minimum.
- Angle parking should not exceed 45 degrees.
- Angle parking spaces shall be a minimum of 9 ft by 20 ft.
- Maximum slope in accessible space is 2% in any direction.
- Access aisles surfaces must be stable, firm & slip resistant.
- Signage is required.
- Adjacent areas must be free of obstructions.
- Detectable warnings shall not be placed on curb ramps for accessible parking spaces.

Passenger Loading Zones

Where passenger loading zones are provided, a minimum of one passenger loading zone complying with the following shall be provided in every continuous 100 ft of loading zone space or fraction thereof.

- A vehicular pull-up space 8 ft wide minimum and 20 ft long minimum.
- Access aisles serving vehicle pull-up spaces shall be 5 ft wide minimum adjacent and parallel to the vehicle pull-up space.
- Access aisles shall extend the full length of the vehicle pull-up spaces they serve.
- The access aisle shall adjoin a pedestrian access route and shall not overlap the vehicular way.

- Access aisles shall be marked to discourage parking in them.
- Access aisles surfaces must be stable, firm & slip resistant.
- Vehicle standing spaces and access aisles shall be level with surface slopes not exceeding 2% in all directions.
- Signage is required.
- Consider potential bicycle and pedestrian facility conflicts when designing and locating passenger loading zones.

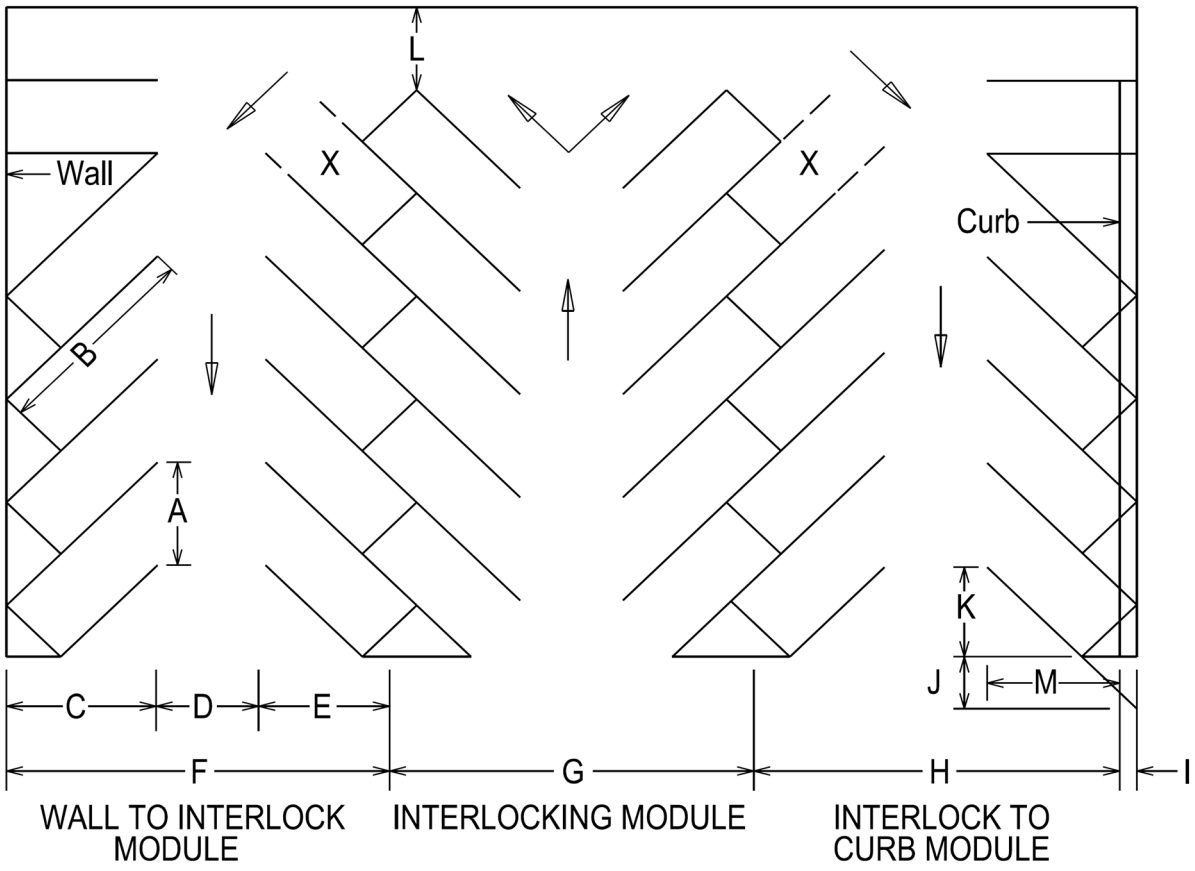
Parking Lots

When designing parking lots, the local governing agency should be contacted to incorporate local statutes and policies in the design of the lot. A general guide for parking layout dimensions can be found in Figure 16-28. This figure assumes 9 ft wide parking stalls. Care must be taken to allow accessible parking where necessary. The accessibility space requirements based upon parking lot size can be found in Table 16-3.

Table 16-3 Accessibility Requirements for Parking Lots

Total Parking Spaces in Lot	Required Minimum # of Accessible Spaces
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 to 1000	2% of Total
1001 +	20 + 1 / 100 over 1000

- Access aisles adjacent to accessible spaces shall be 5 ft wide minimum.
- One in every eight accessible spaces, but not less than one, shall be served by an access aisle 8 ft wide minimum and shall be designated “Van Accessible”.
- Bicycle parking facilities should be considered where applicable.



X = STALL NOT ACCESSIBLE IN CERTAIN LAYOUTS

		45°	60°	75°	90°
Stall Width, Parallel to Aisle	A	12.7	10.4	9.3	9.0
Stall Length of Line	B	25.0	22.0	20.0	18.5
Stall Depth to Wall	C	17.5	19.0	19.5	18.5
Aisle Width Between Stall Lines	D	12.0	16.0	23.0	26.0
Stall Depth, Interlock	E	15.3	17.5	18.8	18.5
Module, Wall to Interlock	F	44.8	52.5	61.3	63.0
Module, Interlocking	G	42.6	51.0	61.0	63.0
Module, Interlock to Curb Face	H	42.8	50.2	58.8	60.5
Bumper Overhang (Typical)	I	2.0	2.3	2.5	2.5
Offset	J	6.3	2.7	0.5	0.0
Setback	K	11.0	8.3	5.0	0.0
Cross Aisle, One-Way	L	14.0	14.0	14.0	14.0
Cross Aisle, Two-Way	L	24.0	24.0	24.0	24.0
Stall Depth to Curb	M	15.5	16.7	17.0	16.0

Figure 16-28 Parking Stall Layout (Parking Layout Dimensions for 9’ Stalls at Various Angles)

BICYCLE AND SHARED USE FACILITIES

Bicycle and shared use facilities shall be considered on all new construction and reconstruction projects in both rural and urban areas. Coordination with the SDDOT Bike and Pedestrian Coordinator on applicable options for the project corridor will be done during the scope and- design phase.

Design consideration should emphasize safety, mobility and accessibility for all modes of travel (including pedestrians, bicyclists, transit riders and motorists) and individuals of all ages and ability. The design solution may not always be an either/or situation, but may require one or two types of facilities to meet the needs and abilities of the traveling public.

Multi-use, shared use and bicycle facility designs shall comply with the current AASHTO publications *Guide for the Development of Bicycle Facilities* and *Guide for the Planning, Design and Operation of Pedestrian Facilities*. National Association of City Transportation Officials (NACTO) *Urban Bikeway Design Guide* and *Urban Street Design Guide*, the Institute of Transportation Engineers (ITE) *Designing Urban Walkable Thoroughfares, Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way; Shared Use Paths; published February 2013; 36 CFR Part 1190* and other current design flexibility guidelines defined by the Federal Highway Administration. As well as previously stated procedures in the sections for Sidewalks, Curb Ramps, Ramps and Crosswalks. Roadway section width will be in accordance with Chapter 7 – Cross Sections, unless specified in the scope document with proper justification.

Determination of Need

Determining the need for the facilities should be evaluated on a case by case basis and may be further designated as areas where inclusion of facilities is required or where more in-depth consideration should be given in the planning and scoping process.

The different types of bicycle and shared use facilities are covered on page 16-48.

When one or more of the following conditions are met, bicycle or shared use facilities should be considered on the project with coordination with the Bicycle and Pedestrian Coordinator:

- Where there is evidence of bicycle traffic along the proposed project.
- Where the project is located along a designated (i.e. adopted) regional or local bicycle route. This includes routes where the local jurisdiction has a comprehensive bicycle policy requiring accommodation or where an accommodation is identified in a local or regional comprehensive plan or master plan.
- Where the route provides access across a natural or man-made barrier, such as bridges over rivers, roadways, railroads, etc. This would include on bridge decks that are being rehabilitated or replaced.
- Where there is an occurrence of bicycle crashes which can be reduced by the inclusion of a bicycle facility as recommended by the State's Highway Safety Engineer.

- Where one or more origin /and destination pair is located adjacent to or within one mile of the project corridor or where the project will provide connectivity between a key origin and a key destination, such as the link between numerous multi-family housing units or residential neighborhood and a middle school or business district. For the purpose of determining these conditions, the definition of adjacent shall be defined as within two blocks or in close proximity to the corridor. The generator does not need to be located immediately adjacent to the roadway to be considered. Shared use or bicycle facility origin and destination generators are as follows:
    - Adjacent to
        - Residential Area
        - Public Transportation Facilities
        - Shopping Center, Strip Mall, Big Box District, Downtown Business District or other retail center
        - Employment Center, Downtown Business District, Industrial Center, Large Employer (Card Services Center, etc.), Workforce Development Facility
        - Senior Center, Assisted Living Facility
        - Group Home, Specialized Housing, Specialized Employment Center
    - Adjacent to or within one mile
        - Park/Recreation Area (may include recreational fields, City park, nature park, arboretum, swimming pool complex, etc.)
        - School, College, University
        - Major Public Institution (Hospital, Library, Government Center, Convention Facility, etc.)
- Where there is an existing bicycle or shared use path along or linking to the end of the project corridor or where the project corridor will provide a missing connection between two existing bicycle facilities (i.e. linking the end of one shared use path to another)
- Where projected growth, comprehensive plans, master plans or other planning tools can reasonably predict future growth (within 5 years) and need for a facility in the project corridor.
- Where the inclusion of a bicycle or shared use facility in the project could help to increase bicycling and walking, could reduce motor vehicle congestion, could provide better access to jobs, provide safe and increased mobility options for underserved populations (seniors, mobility challenged, non-drivers) and/or increase tourism or economic development.
- Where planning analysis, engineering judgment or the public involvement process indicates need.

Selection of the Appropriate Facility

Once the determination of need is made, the selection of the appropriate bicycle or shared use facility must be completed. There is a variety of facility types and, in some instances; multiple facility types may be needed in the same corridor to accommodate the users and function of the facility. For example, the appropriate facility to provide bicycle access for elderly or underserved communities to downtown services (pharmacy, post office, senior center, social services) would likely be different than the facility to provide commuter bicyclists access to the same downtown area. The following types of facilities are an example of those available, however the current AASHTO publications *Guide for the Development of Bicycle Facilities* Exhibit 2.3 provides more information on selecting a facility type. In addition, the *AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities*, National Association of City Transportation Officials (NACTO) *Urban Bikeway Design Guide* and *Urban Street Design Guide*, the Institute of Transportation Engineers (ITE) *Designing Urban Walkable Thoroughfares,* and other current design flexibility guidelines defined by the Federal Highway Administration should be consulted for other acceptable types of facilities.

Types of Facilities

- Existing Highway: Existing highways may serve as the base system to provide for the travel needs of some bicyclists. In most cases very minor alterations are needed to upgrade existing highways into bicycle safe facilities. Some items that need consideration are inlet grates, railroad crossings, bridge expansion joints, smooth pavements, rumble strips, shoulder width and surface type, and section widths.

- Shared Roadway: Any roadway upon which a bicycle lane is not designated and which may be legally used by bicycles regardless of whether such facility is designated as a shared roadway. In urban locations an additional 3' should be added to the outside lane (not including the gutter width). In locations with lower speeds and reduced traffic volumes a shared lane marking and/or signage may be used. Justification should be included in the projects scope if additional width is not provided.

  To some degree bicycles will be ridden on all highways where they are permitted by law, therefore a designer should always consider all forms of traffic that will be using the designed facility. Most highways designed to AASHTO specifications will provide this level of service.

- Bicycle Lane: A portion of a roadway that has been designated by striping, signing, and/or pavement markings for the preferential or exclusive use of bicyclists. In an urban setting, this may be a 3 foot shoulder developed between the travel lane and the gutter, not including the gutter width. An additional two feet should be provided if adjacent to parking and space allows, in some cases marking this buffer may be applicable.

Additional width on the roadway may be considered if there is a defined need, the route has been identified as a part of the city's bicycle plan, and the impacts are acceptable. See Figure 16-29 for typical bicycle lane widths.

On rural roadways, a bicycle lane is usually incorporated as a paved shoulder. This would include a four foot clear shoulder for bicycle use, not including the rumble strip width.

Shared Use Path: A shared use path is physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent right-of-way. Most shared use paths are designed for two-way travel and are a supplemental network to on-road bicycle facilities and should not be used an alternate for an on-road bikeway. Shared use paths may be used by bicycles, pedestrians, skaters and other non-motorized users. A side path is a type of shared use path that runs adjacent to the roadway and should only be used when other shared use path options are not available. Vertical clearance to obstructions shall be 100 inches minimum and 120 inches desired.

The same considerations (design speed, horizontal alignment, superelevations, grade and etc.) that go into designing a highway system also apply to shared use facilities. The AASHTO *Guide for the Development of Bicycle Facilities* contains many useful design parameters and considerations. See Figure 16-29 for minimum shared use path configurations.

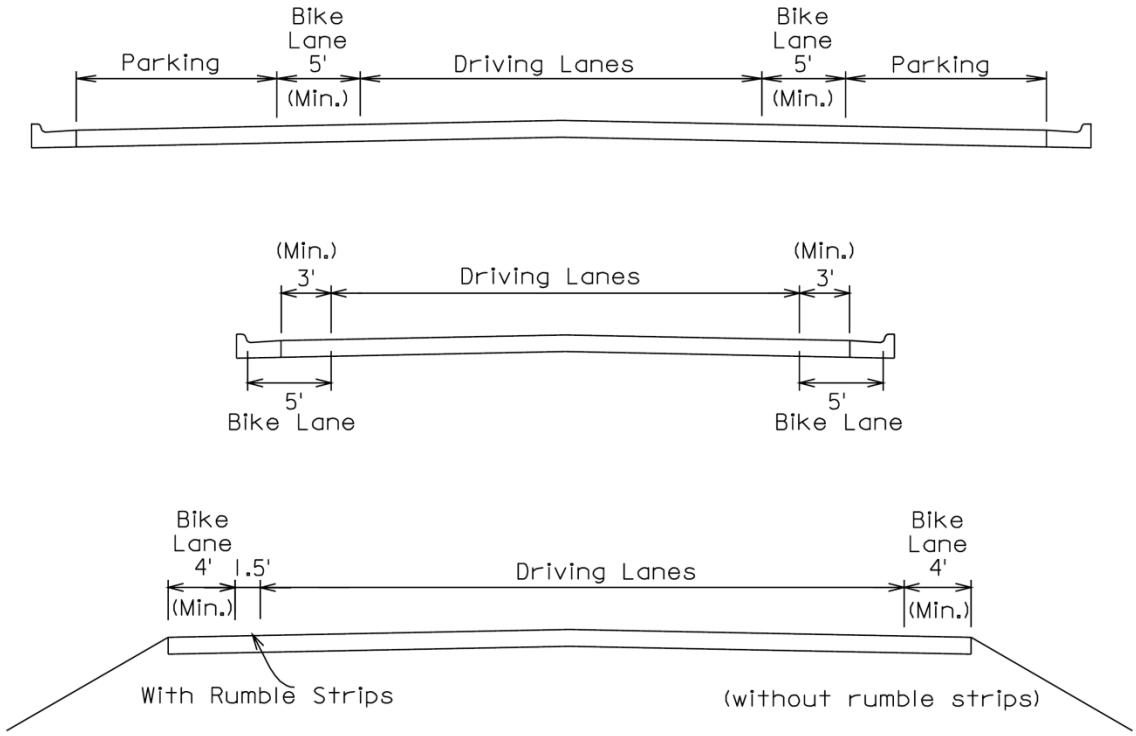


Figure 16-29 Typical Bicycle Lane Widths Adjacent to Roadways

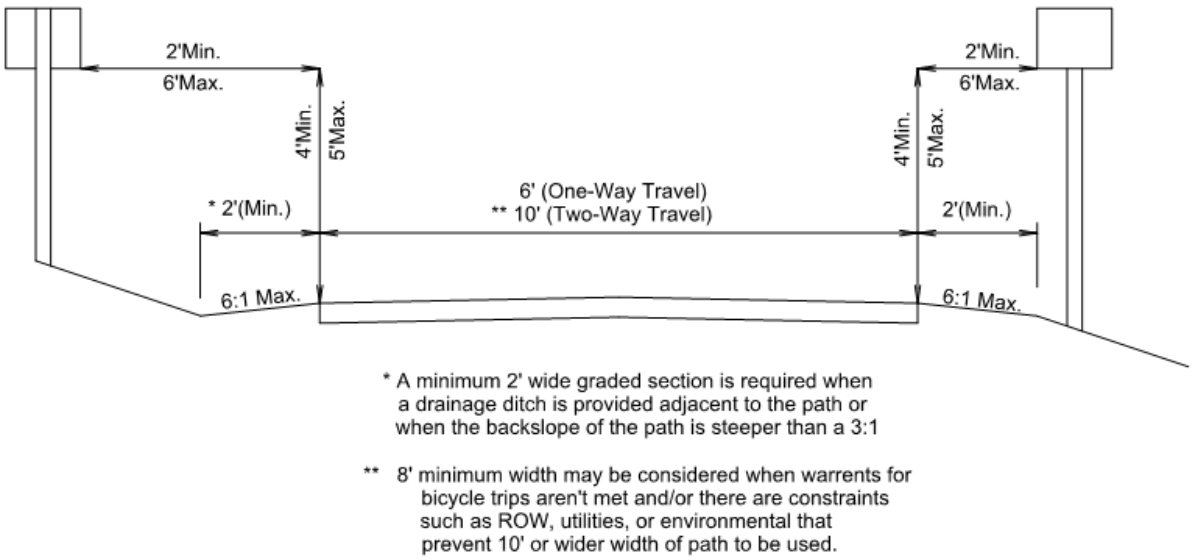


Figure 16-30 Typical Shared Use Path Configuration

Funding

- For locations which meet the bicycle accommodation criteria, the cost for installation will be at the states expense. The local entity will be responsible for maintenance, repair, and replacement of curb ramps, including detectable warnings, in accordance with the Americans with Disabilities Act.
- For locations which do not meet the accommodation criteria and the government entity requests improvements, the cost of improvements should be borne by the requesting entity. The local entity will be responsible for ROW costs, engineering costs, construction costs, additional lighting expenses, signing, maintenance, repair, and replacement of curb ramps, including detectable warnings, in accordance with the Americans with Disabilities Act.
- For locations which do not meet the accommodation criteria and the state recommends improvements, the cost for installation will be shared between the state and the local governing entity. The bicycle facility should be identified in the local governments bicycle plan and the minimum local government share will be 20% up to a maximum of 100%. The local entity will be responsible for facility maintenance, repair, and replacement of curb ramps, including detectable warnings, in accordance with the Americans with Disabilities Act.

TRAFFIC CONTROL MEDIAN CROSSOVERS

Median crossovers are used to detour traffic around construction work into the opposing traffic lanes on divided or interstate highway systems. Median crossovers shift traffic across the median, providing 2-way traffic service around the construction site. Two median crossovers will be required to divert and revert traffic back to normal conditions. The speed of traffic is usually reduced through and sometimes between the crossovers.

Standard Drawings are available for 60 ft, 66 ft, and 80 ft median widths. These standards allow 45 mph, 55 mph, or 65 mph traffic to be maintained. Refer to the standards for geometrics and design details. Special considerations must be given to situations deviating from the standards.

The Median Crossover Standard was developed to detour traffic in either direction. A 12 ft driving lane with 4 ft shoulders is used with 1,432 ft radius. A tangent section greater than 100 ft is used to neutralize centrifugal forces prior to introducing reverse crown. The standards use 0.02 ft/ft (2%) cross slopes continued to median centerline.

At the median centerline a slotted drain pipe is typically used to drain collected water. In the case of deep ditch sections the slotted drain ties into a culvert which allows drainage through the median crossover.

Design Considerations

Locations of the median crossovers should be decided upon by a joint effort between Regional and Central Design Offices. The location of the crossover should be based on horizontal and vertical features of the roadway and the beginning and ending of the project. An ideal location would have both roadways level. Location at a median ditch line summit can eliminate the long culvert running through the crossover, thus eliminating some extra cost.

At sites requiring scheduled maintenance such as bridges and overpasses, median crossovers may be developed as permanent installations. Permanent installations typically use asphalt concrete surfacing, but PCC pavement may be used also as determined by Materials and Surfacing Office. The Region Traffic Engineer is responsible to develop plans to sign detours when in use as well as barricading the median crossovers when not in use.

The details of median crossovers deviating from the standards would require a joint design effort between the Materials and Surfacing, Road Design, and Region Offices. The surfacing thickness, shoulder widths, and proposed side slopes all need to be considered for designing drainage systems and other details. When special median crossovers need to be created, the Road Design Office shall provide the geometric design of the crossover and the Materials and Surfacing Office shall provide the surfacing details. Typically the Surfacing Plans Office will provide the median crossover details in their portion of the plans along with estimated quantities for the median crossover.

DETOURS / TRAFFIC DIVERSIONS

Detours and Traffic Diversions are used to provide traffic maintenance during construction. A routed detour uses a parallel route to carry traffic off-site while the construction roadway is closed to through traffic. A traffic diversion provides a temporary low-level service route on-site to direct traffic flow around construction zones within the construction project. Pedestrian, bicycle and transit detours must also be designed to provide multi-modal traffic maintenance during construction.

Standard Plates are available for signing, barricading, and marking of detours and traffic diversions. The Region Traffic Engineer or Area Office usually provides this information with the traffic sequencing notes.

If at all possible, traffic diversions should be located on the upstream side of the work zone. This is to prevent water from damming back into the work site. The contractor is responsible for sizing the temporary drainage structure with drainage areas under 1000 acres. For drainage areas of 1000 acres or more structure sizing will be provided by the Office of Bridge Design, Hydraulics Engineer. A 15 ft minimum clearance is desirable between the traffic diversion inslope and the construction work zone limits (i.e. the end of a box culvert would be considered the work zone limit.) The actual location of the traffic diversion shall be decided upon at the Road Design site inspections and in consultation with the Office of Bridge Design.

On-site traffic diversions should be designed for a 30 mph urban design.

- Minimum Curve Radius: 353 ft
- Vertical Curve K Values: 19 - crest and 37 - sag
- Maximum Vertical Grade: 10%

A minimum of three PI's should be used to route the alignment around the work zone. The traffic diversion should be designed so that a minimum of 15 feet is provided between the inslope of the traffic diversion and the mainline slope or the end of the structure as shown in Figure 16-30.

The minimum radius is 353' (Based upon a Negative 3% Superelevation Rate) for a 30 mph urban design speed and a 3% normal crown. For a traffic diversion alignment, a typical design would provide three R = 400' radius curves. The designer can increase or decrease the curve radii (to the minimum radii for a 30 mph urban design) based upon site specifics.

Superelevation is not required on traffic diversions. The traffic diversion subgrade is typically constructed to a 28 ft width and 4 in. of gravel surfacing. The inslopes are 3:1 and in situations where cuts are encountered, a 2 ft deep ditch would be created with 3:1 inslopes and backslopes.

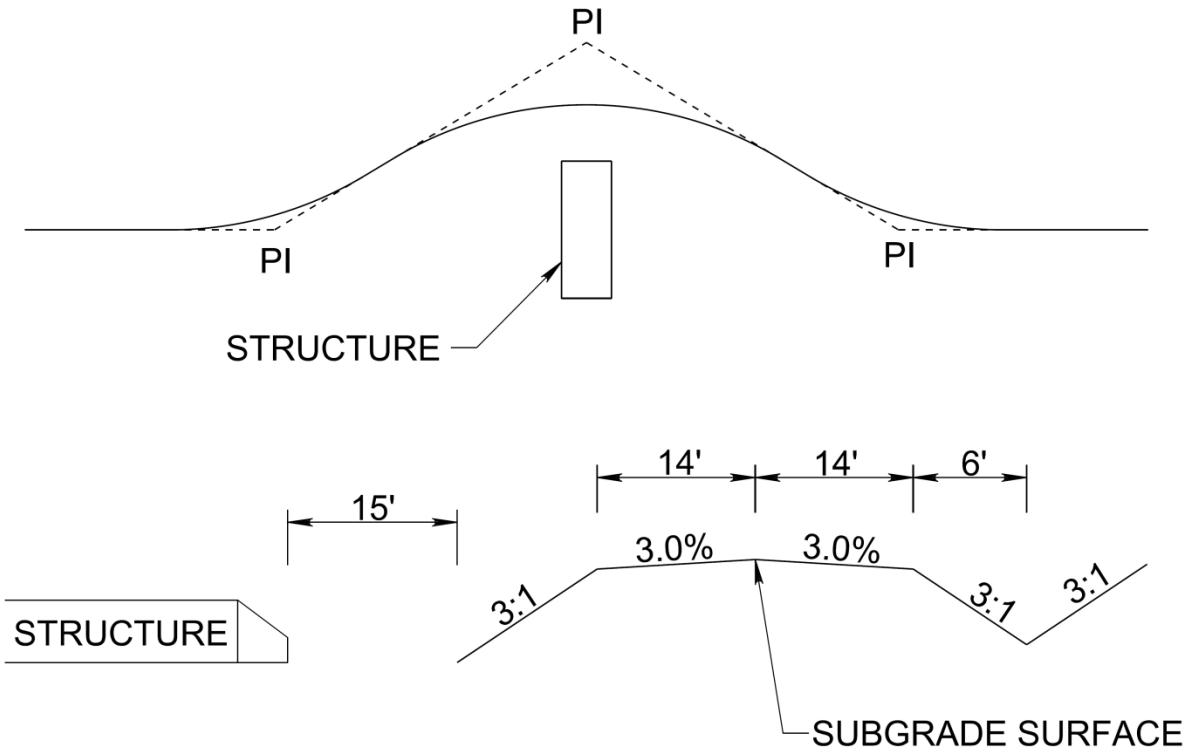


Figure 16-31 Diversion Design

A non-eroding riprap is used for all fills below the ordinary high water mark as defined per the Corps of Engineers. This elevation shall be provided by the Hydraulics Section of the Bridge Design Office. See Chapter 8 - Earthwork Computations of the Road Design Manual for notes and items required on the final plans.

NOISE AND SIGHT BARRIERS

Noise and sight barriers have different definitions; however, one barrier can act to satisfy both conditions. Both noise and sight barriers are constructed to satisfy the needs and concerns of people living or working near or adjacent to highways. Careful consideration must be used to ensure that the placement of the barrier does not create a safety hazard on the highway. The barrier should be placed beyond the clear zone so as not to reduce the safe stopping sight distance. Care must also be taken in placing the barrier in or near a gore area.

Noise Levels

The Federal Highway Administration has set noise abatement criteria for several different land uses. Noise levels fluctuate from several different factors including traffic characteristics (speed, volume, and composition), topography (vegetation, barriers, and distance) and roadway characteristics (configuration, pavement type, grades, and type of facility). If there is a concern as to the noise level, the Environmental Office shall be notified to determine if the noise level has been exceeded.

Noise and Sight Reduction Design

There are various methods of reducing noise levels. Most methods of noise reduction will not only reduce the noise level but will also provide adequate sight reduction for the facility. In the same aspect, most sight reduction techniques will also reduce the noise level.

Some examples of noise and sight reduction designs are lowering or raising the grade of the roadway or providing special barriers constructed of earth, concrete, wood, metal, or vegetation.

The lowering or raising of the grade of the roadway is an effective method of reducing the noise level and any sight problems. However, this method can be costly and must be done during construction of the road. It is not a method that can be applied at a later time. Barriers made of earth are very effective for both sight and noise reduction but may be a problem where right-of-way is a consideration. A combination of a small earth barrier with a wall on top can be constructed to attain the required height. Concrete, wood, and metal walls can be placed; however, walls can be expensive and have poor aesthetic value. Vegetation can be used in various methods and locations. Vegetation is a poor sound buffer but is aesthetically pleasing. Consideration should be given to the type of vegetation used as when the trees lose their leaves, the effectiveness of the barrier is greatly reduced.

Both the Offices of Bridge Design and Geotechnical Design will need to be involved with the actual wall design. Road Design will need to work with these offices along with the Environmental Office to determine the exact limits of the wall and other design issues.

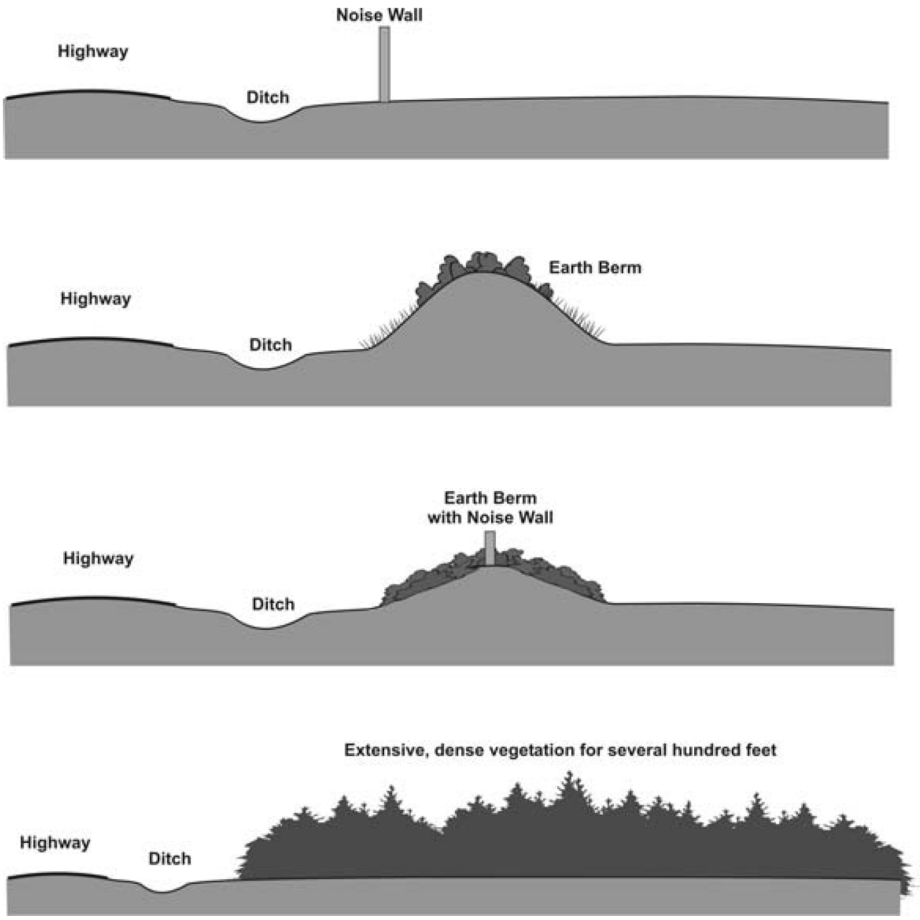


Figure 16-32 Common Noise Barriers

References for Noise Barrier Design:

AASHTO A Policy on Geometric Design of Highways and Streets
FHWA Highway Noise Barrier Design Handbook
Noise Barrier Design - Visual Quality - Design Construction - Noise Barriers - Noise - Environment - FHWA

RETAINING WALLS

Retaining walls can be used where constructing earthen backslopes or inslopes would be undesirable or expensive.

The type of wall used should consider the following: the need for aesthetics, landowner preference, height of wall, economics, and geology/foundation considerations. The decision of what type of wall to use shall consider the previous items and be a joint decision of all involved parties (Offices of Road Design, Bridge Design, Geotechnical, Field Area Office, and the public).

Typical wall types used and some of their applications:

- Type C Concrete Retaining Wall (maximum height is 4 ft). Typically used in cut situations to hold back material from roadway. The following retaining walls require special design by the Office of Bridge Design:
    - Retaining walls taller than 4’-0” - This type of retaining wall will be paid for by the quantities of reinforcing steel, concrete, etc.
    - Retaining walls finished with form liners – This type of retaining wall will typically be paid for with the Special Type C Concrete Retaining Wall.
    - Walls not adjacent to pavement or curb & gutter and are higher than 1’-9” This type of retaining wall will typically be paid for with the Special Type C Concrete Retaining Wall.
- Mechanically Stabilized Earth (MSE) Retaining Wall. Can be used for variable heights. There are several types including:
    - Wire Face: Taller walls are not a problem. Good where settlement may be a problem.
    - Large Panel: Taller walls are not a problem. Used where aesthetics are important.
- Gravity Large Concrete Block Retaining Wall (also referred to as monster block): Taller walls are not a problem. Used where minimal excavation behind the retaining is required
- Segmental Block (i.e. Rockwood, Keystone, etc.): Typically used for shorter walls where aesthetics are important.
- Though seldom used, other types of specialty walls such as timber or metal can be used where appropriate.

Road Design’s responsibility is to set the general limits (horizontal and vertical) of the wall. Both the Offices of Bridge Design and Geotechnical Design will need to be involved with the actual wall design except when using Type C Concrete Retaining Walls, which is a standard plate. Road Design will need to work with these offices to determine the exact limits of the wall and other design issues.

Typically, when the roadway is in a fill and the wall is used to hold the roadway fill back, the wall is located within the highway right-of-way. When the roadway is in a cut and the wall is used to hold back material from the roadway and is less than 4 ft, a MSE (Segmented Block) Retaining Wall is typically located on private property and a Type C Retaining Wall is typically located within the highway right-of-way. The decision of where to locate taller walls shall be on a case by case basis. Something else to consider is that certain types of walls have tieback systems that may extend some distance behind the wall. Make sure to have the necessary right-of-way to accommodate such walls. Estimate the ROW or temporary easement need at 6 ft from the back of the proposed wall, or use the height of the wall whichever is greater. The limits of the wall should be determined and all necessary right-of-way shown on the plans before releasing construction plans to the ROW office.

Barriers on Top of Retaining Walls

When designing a retaining wall, determine if vehicles, bicycles, pedestrians or children are likely to be present near the top of the wall. Install a barrier at the top of any wall which is over 30 in. tall if the top of the wall is to be adjacent to a sidewalk, trail, parking lot or stairway landing. As good practice, if the drop off occurs within a horizontal distance of 2 ft from the edge of the pedestrian path, this path should still require the barrier. Walls located farther from human or vehicular activity may be higher before a barrier is considered necessary. In any case, provide a barrier if it is determined to be necessary, regardless of the height of the wall.

The barrier on top of a wall could be a fence, beam guardrail, or a railing. Coordinate the selection, location and installation details of a proposed barrier with the Office of Bridge Design. Consider aesthetics of any barrier, especially in urban areas where the wall and barrier is located adjacent to private property.

RAILROAD CROSSINGS

Railroad grade crossings on Federal-aid highway projects requires that adequate warning devices be installed and functioning properly at railroad-highway grade crossings located within the limits of or near the terminus of a Federal-aid highway project. These devices must be installed and functioning properly before the crossing can be opened for unrestricted use by traffic or before the project can be accepted. Coordinate with FHWA and Project Development to define terminus of a Federal-aid highway project.

Projects with at-grade railroad crossings require special consideration by designers. The railroad company will perform all work necessary for the adjustment of their tracks to meet altered or established highway grades and will construct the roadway grade crossing as indicated on approved state highway plans. The railroad company will also install flashing light signals, gates, guardrail, or other required protective devices in accordance with Department plans. Pedestrian/Bicycle/Shared Use crossings should be considered at all crossings within city/town limits if the potential for future bike/ped crossing needs exist, even if a sidewalk or path does not currently exist.

All work by the railroad company will be accomplished by agreement between the railroad company and the Department. The Right-of-Way Office negotiates and obtains permanent and temporary easements. Office of Project Development negotiates agreements for protective devices, crossing or track work required as necessary for construction projects, this would include any permits necessary from the railroad company for installation of any utility work such as conduit for roadway lighting, signals, storm sewer that will be installed under any railroad track, etc. Plans for field inspection should be submitted to the Right-of-Way Office as soon as they are available.

In the case of highway improvement or relocation necessitating an easement on or across the railroad right-of-way, a plat will be prepared for acquisition of the required easement from the railroad.

On urban projects, curb and gutter ends 10 ft from the centerline of the railroad track as shown in Figures 16-33 and 16-34. A concrete curb taper is then used to terminate the curb and gutter at this location. When there is adjacent sidewalk to the curb and gutter, special curb transitions/tapers need to be placed to comply with standards regarding sidewalk construction as previously outlined in this chapter. Detectable warnings will also need to be placed on the sidewalk adjacent to the railroad crossing (See standard plate 651.20).

Design railroad crossing so that the pedestrian paths of travel intersect the railroad at a 90 degree angle, which minimizes problems with the flange-way gap width. This may require a crossing to be widened or realigned.

Refer to Road Design Manual Chapter 6 – Vertical Alignment for gradeline information at railroad crossings.

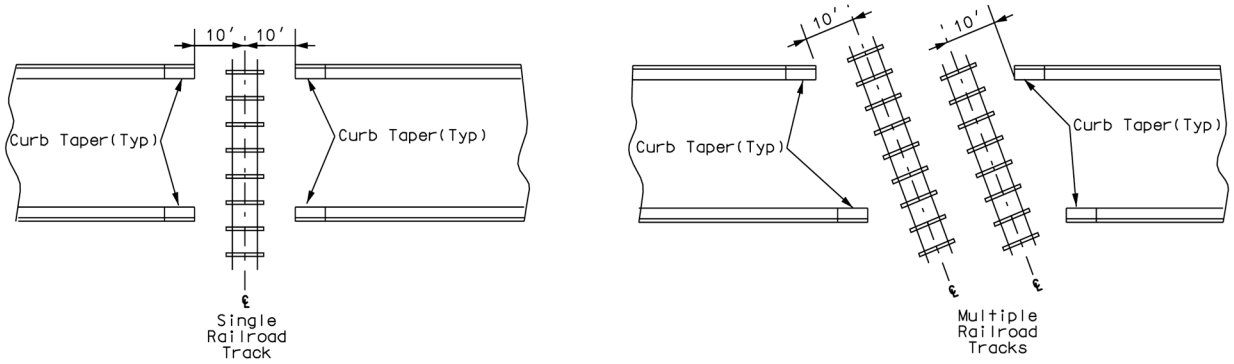


Figure 16-33 End of Curb and Gutter Adjacent to Railroad Tracks

Medians

Where median-mounted warning devices will be installed and other than an earth median is adjacent to a grade crossing, the median should have a barrier-type curb with a minimum median width of 8.5 ft back of curb to back of curb. Additional median width may be necessary for the installation of a signal system with gates to allow for counter weight length. Work with the Office of Project Development for the necessary width needed. Medians should be 60 ft long or longer. All medians and curbs should be tapered to the level of the pavement 10 ft from the centerline of the railroad tracks.

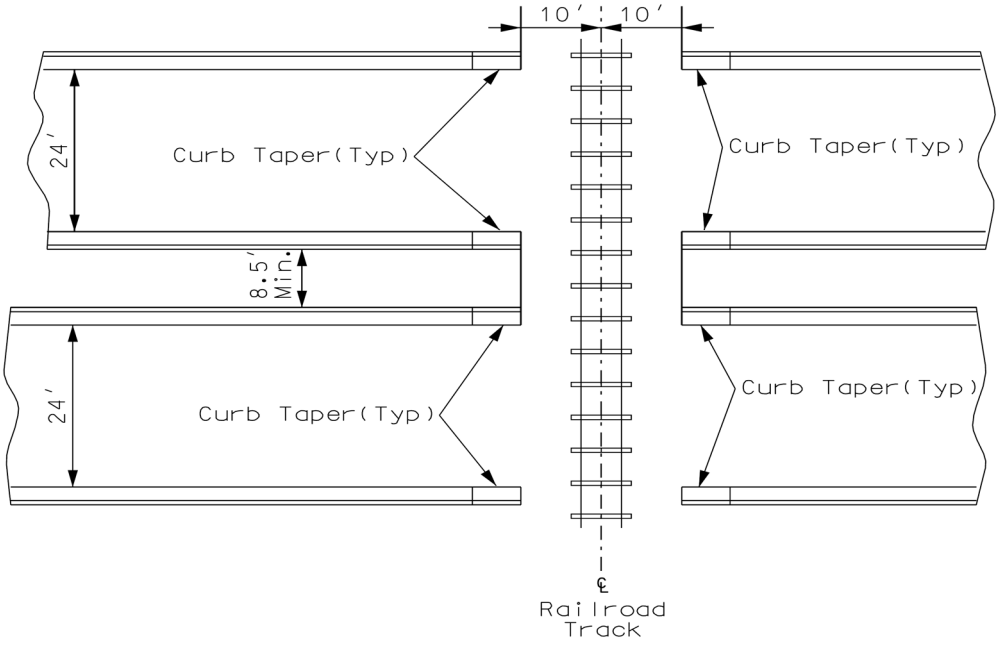


Figure 16-34 Median Layout Adjacent to Railroad Tracks

MAILBOX LOCATION

Mailbox and newspaper containers installed within SDDOT right-of-way are limited to those used for delivery to individual local resident/owner.

Distribution-Transfer boxes or similar devices shall not be located within SDDOT right-of-way.

Mailbox containers shall conform to the requirements established by the U.S. Postal Service and located on the right-hand side of the highway in the direction of travel of the carrier.

Construct necessary turnouts on all grading, shoulder widening and slope modification projects.

Mailboxes should be located so that a vehicle stopped at a mailbox is clear of the adjacent traveled way. Most vehicles stopped at a mailbox will be clear of the traveled way when the mailbox is placed outside an 8 ft wide usable shoulder or turnout.

Mailboxes serviced from an approach shall be located a minimum of 20 ft from the edge of the adjacent main driving lane. Turnouts will not be required.

SDDOT AIRPORT COORDINATION AND CLEARANCE GUIDANCE FOR CONSTRUCTION PROJECTS

Identify if FAA coordination will be necessary for a construction project based on the following criteria:

- A project is within 4 miles of a public airport and the construction or alteration involves a structure or use of a temporary structure/equipment that could potentially extend into a defined path of a 100:1 slope for a horizontal distance of 20,000 feet from the nearest point of the closest runway.
    - If a project is within the 4 mile criteria, but it is determined that the structure or temporary structure/equipment could not potentially extend into the defined path of a 100:1 slope, then document this finding within the project files and no further action is necessary.
    - If a project is within the 4 mile criteria and it is unclear, or marginal, if the structure or temporary structure/equipment could potentially extend into the defined path of a 100:1 slope, FAA's Notice Criteria Tool shall be utilized to determine if a filing is necessary. If the Notice Criteria Tool indicates that filing is necessary, then proceed to the filing instructions below. If the Notice Criteria Tool does not require a filing, then document this finding in the project files and contact the Office of Aeronautics.
    - If a project is within the 4 mile criteria and it is clearly determined that the structure or temporary structure/equipment will extend into the defined path of a 100:1 slope, then proceed to the filing instructions below.

- A project is within 0.5 miles of a hospital heliport and the construction or alteration involves a structure or use of a temporary structure/equipment extending more than 15' above ground. Contact the Office of Aeronautics to determine the appropriate course of action.

Permanent Structure Filing: Once it has been determined that a permanent structure filing is needed, the responsible designer shall complete the FAA Structure Case Data Form and submit it to the Office of Aeronautics. The submission shall include listing the equipment that is anticipated to be used for the permanent installation that will impact the airway.

- At the appropriate time, the Office of Aeronautics will complete the required FAA form 7460-1 "Notice of Proposed Construction or Alteration" and obtain the necessary SD Aeronautics Commission permit. The Office of Aeronautics will include the responsible designer's email address on the submittal, which will ensure the responsible designer is informed of the FAA finding.
- Based on FAA determination, any FAA stipulations shall be added to the plan notes (see FAA plan notes) to inform the contractor and the responsible Area Office of the construction requirements.

Temporary Structure/Equipment Filing: 3 to 4 months prior to the scheduled project ready date, the responsible designer shall complete the FAA Structure Case Data Form and submit it to the Office of Aeronautics.

- At the appropriate time, the Office of Aeronautics will complete the required FAA form 7460-1 "Notice of Proposed Construction or Alteration." The Office of Aeronautics will include the responsible designer's email address on the submittal, which will ensure the responsible designer is informed of the FAA finding.
- Based on FAA determination, any FAA stipulations will be added to the plan notes (see FAA plan notes) to inform the contractor and the responsible Area Office of the construction requirements.

Project Development staff will document the status of FAA coordination and clearance matters on the contract 292 submitted to FHWA prior to bid advertisement.

Permanent Structure Installation: During construction, the Engineer administering the contract shall notify the Office of Aeronautics regarding progress on the structure(s) and complete the FAA Structure Case Data Form with the as-built structure information. The Office of Aeronautics will then complete FAA form 7460-2 "Notice of Actual Construction or Alteration" which must be filed with FAA within the timeframe specified in the FAA Determination.

- Note – The filing of the 7460-2 is both critical and time sensitive, therefore it is important that the as-built information is provided to the Office of Aeronautics as soon as possible.

Filing for an Extension: An FAA determination is valid for 18 months from the date of determination. If it becomes evident that the construction or alteration will not be

completed by the expiration date, contact the Office of Aeronautics and request an extension.